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OF all the problems which now perplex the mind of Europe, the proper adjustment of the rights and duties of Employers and the Employed is the most pressing and the most difficult. Earnestly and anxiously do we look for its worthy solution: earnestly and anxiously do we hope that both classes will exhibit mutual forbearance and consideration. Modifications must come; but pending the decision of them, let us all, whether workman or master, endeavour to discharge faithfully those obligations which our present position obviously involves,—those obligations which Reason, Justice, Kindliness, Charity, make immutable.

The differences between the body called "The Amalgamated Society of Engineers and Mechanics," and the Employers of operative engineers, to which we alluded last week, have taken a fearfully serious aspect, involving not merely immediate injury, privation, and suffering to thousands of individuals, but ultimate loss to the whole nation.

The demands of the society, made to a leading firm, in the first instance were,—

"1. The abolition of overtime, excepting in case of break down.

"2. When overtime is absolutely necessary that it should be paid for at double rates.

"3. The abolition of the system of piece-work.

"4. The unconditional discharge of all labourers, or such class of persons at present engaged in working planing machines, or tools of similar character, and the employment in their stead of mechanics, members of the Union."

These were accompanied with the threat of a strike on December 31, in the event of non-compliance. This threat the council afterwards repudiated, but they maintain their intention of "abolishing piece-work and overtime," and of otherwise, as is inferred, "organising labour." The masters, feeling the insecurity of their position under such notices, and the evils that would follow on both sides if such dictation were yielded to, have associated themselves together in self-defence, and have resolved, unless the demands be withdrawn, entirely to close their establishments on the 10th inst. Their views may be gathered from the following resolutions, which were passed by them unanimously on the 24th ult.:—

"1. That while this nation, by its representatives in Parliament, has abolished guild privileges, exclusive charters of corporate handicrafts, restrictions on the export of machinery or free egress from the realm of skilled workmen, and all monopolies, the foregoing requisitions of the Amalgamated Society are an attempt to ignore the right of every British subject to dispose of his labour or capital according to his individual views of his own interest—to deprive the skilled workman of the natural advantages of his superiority—forcibly to compel the industrious and careful mechanic to share the profits of his assiduity and dexterity with the slothful and inexpert—and deliberately to deprive the unskilled labourer of the means of employment.

2. That the dependence of the public prosperity upon the steady and uninterrupted pursuit of mechanical industry renders it essential to the successful development of practical engineering enterprise, to the protection of the community from extortionate prices, of the capitalist from becoming the slave of his own hands, and of the steady and able workman from encroachment upon his independent rights of labour, that the threats conveyed in the foregoing manifesto of dictation to employers and tyranny over the employed should be promptly and peremptorily resisted.

3. That while the division of labour, which is essential to the profitable prosecution of mechanical enterprise, renders the employment of one denomination of workmen dependent upon the co-operation of those engaged in other departments, the threatened strike of the Amalgamated Society, by withdrawing certain classes of artisans from the factory, must have the effect of throwing their fellow-workmen out of employment, by compelling masters to close their establishments until the combinations of skilled labour, interrupted by the secession of the members of the Union, can be supplied."

We have no desire to encourage working over-time: employers, as a matter of course, never resort to it unless forced, inasmuch as they unquestionably get less work for their money than in the ordinary course. But that any society, "amalgamated" or otherwise, should endeavour to establish as a law that masters *shall not* allow operatives to work over-time,—that full-grown responsible men shall not be *permitted* to work over-time,—seems to be scarcely credible. It is perfectly well known that the men regard permission to work over-time as a privilege, and we are compelled to regard the demand simply as a war-cry and a pretext on the part of those who act for the operatives. With what class of men is this prevention to stop? And why, if a "resolution" can settle the matter, should not eight hours, six hours, four hours daily, be long enough for work? Would that it might be so! And may they not employ any of their over-time in any other calling with a view to improving their means? Certainly not; because in that case the members of the calling so invaded could, on the same grounds as those set forth by the "Amalgamated Society of Machinists," at once interfere and prevent them. Those, of any class, who are not workers in over-time, have little chance of effecting for themselves an advance. Let them advise their fellow-workmen to cease working over-time and to spend the evenings in improving their minds: let them warn them against accepting good employment at piece-work (which tends to set the industrious and skilful above the idle and unskilful) if they will; but to say that men shall not do one or accept the other in this the 19th century—this the era of free-trade—seems absurd and incomprehensible.

The demand for the dismissal of the labourers employed on machines, and the substitution for them of skilled workmen (where skill would not be needed and so would be thrown away), is a cry against machinery, and is to increase the cost of production. Would other countries do so too? Certainly not; and those who produce cheapest and best will sell most.*

The Amalgamated Society propose, it seems, in the event of the masters closing, to take the place of the employers, and, as far as the public may supply them with orders, to carry on the ordinary business of their respective trades. They have determined—

"1st. That 10,000*l.* of the funds of the Amalgamated Society shall be paid over to such number of trustees, not less than six, as are selected by the executive, such trustees to be men in whom public confidence would be placed in consequence of their position in society; and to advance portions of the same from time to time, to managers appointed by the executive (whose appointments are to be afterwards confirmed by the society), for the purpose of carrying on the business of engineers, machinists, &c.

"2nd. These advances, as well as others which the trustees may obtain from other sources, shall be secured by a mortgage of all the plant and stock in trade employed in such business, to the said trustees, who shall have a power to give a preference security to any such other advances over sums advanced out of the funds of the Amalgamated Society.

"3. The conditions of work under which such business is carried on shall be such as are approved of by the executive of the Amalgamated Society, from time to time, with the view of giving employment to the greatest possible number of members of the trade who are out of employment for the time being, consistently with the stability of the business, and the welfare of the workmen employed."

Much may be done by a co-operative body of workmen; but from an association under the present circumstances, we should not expect a favourable result. If the profits of masters were so large that operatives working as joint masters, with the disadvantages necessarily attending such an arrangement, could pay for the capital required, and obtain larger wages and freer rules than they now enjoy, other capitalists would come into the trade, and producing thus a greater demand for men, the rate of wages would rise. At this moment, so far as we can learn, the masters are not realizing large profits; and, if they had to pay greater wages, which, after all, is the result looked for in all such movements, they could not compete with foreign rivals, trade would be checked, the capital now employed in it be diverted into other channels, fewer workmen would be needed, and the competition for employment becoming greater, wages would naturally fall. It is often urged that manufacturers should not avail themselves of the reduction in wages brought about by competition or other causes, but continue to pay the former higher rate. This, however, is not to be expected, and if it were attempted could not possibly last. As a writer in the current number of the *Westminster Review* justly remarks:—

"The manufacturer who, by rejecting those who offered their services at reduced wages, attempted to keep up an artificial price of labour, would soon find himself distanced in the race: his competitors would be carrying on their establishments at less cost than himself: his means would be crippled, and his profits disappear and be replaced by loss; and the ultimate effect of his unscientific benevolence would be, that his power of doing practical good would be at an end. If it were attempted to evade this consequence by maintaining the artificial price of labour by legislative or by any over-riding social influence, and the attempt should be successful, the only result would be the transference of our superiority to foreign rivals and the diminution of demand for our fettered productions. The individual manufacturer in the one case, the whole nation of manufacturers in the other, would find that the issue of their kindness—the consequence of their resolution to give good wages only to a few—would end in their having no wages at all to give to any. The plain truth is, that neither the most boundless benevolence, nor the most consummate ability, can fight against the clear moral and material laws of the universe. If the field of employment is too limited for the numbers who crowd into it, no power and no goodness can prevent wages from falling; and all schemes, whether old or new, *for enabling labourers to be redundant, and yet to evade the consequences of their redundancy*, must come to nought."

What we want is a movement for educa-

* This demand has been withdrawn.

ional and social progress,—a union of masters and men for mutual advantage, not the union of class against class. Earnestly we implore the body of operatives to reconsider and withdraw their unwise demands; and, if it be not too late, we would with equal earnestness implore the masters to pause yet a short time longer before throwing 100,000 persons out of bread, punishing alike the innocent and the offending.

ARCHITECTURE AND HER OFFICES.*

IN showing how Architecture is adapted to preserve the other arts, not alone without injury, but also with benefit to herself, we may glance at the analogy between them. All they have in common depends upon the perfection of the sight from continued observation of nature in her forms and effects: from this observation arises, in all, the facility of comparing works of art with nature, or with that remembrance of it of which the observing mind always retains a strong impression, storing up some idea of beauty, grace, or grandeur which it afterwards strives to reproduce. The minds of different artists gather then a similar idea, possess a similar type or standard from which to work, and the result will be that the several beauties expressed by each will harmonize, especially when employed for a common object, and will produce in union one transcendent beauty, attainable by not one of them alone. To sculpture belongs exact observation, intimate acquaintance with beauty,—to painting, harmony, perspective, proportion, knowledge of colour and effect; and true architecture must also possess these, even though she avoided adorning herself with the actual works of the other two. But if perfect in her own developement she expresses the principles of the others in her peculiar work; and, consequently, when these three graces stand together, they are at once seen and felt in grace to harmonise, because of this secret community of principles on which they are formed. But, to enter more fully into the question of connection between the arts, there is a greater analogy, theoretically considered, between architecture, poetry, and music than between architecture, painting, and sculpture. We have seen that the connection between the two latter and our subject rests,—as on their in common being arts of design,—so on the exercise of certain things necessary to the right practice of each, such as study of nature, accurate observation, and the like. "Language," says M. Legrand, "refined from that in common use, and subjected to rhythm and regulated metres, often allowing of musical imitation of sounds, grace, beauty, grandeur of imagery, expression so chosen as most directly to appeal to the soul, proportion of details to each other and the whole, that whole gradually growing upon the understanding with one complete effect of many combined charms – and the object too often forgotten, of pleasing only the better to instruct,—these constitute the attractions of poetry." Music results from sounds combined, like the words in poetry, in similar measures; from expression of moral situations by means of accents descriptive of nature; from the combination of these accents in one skilful harmony; from an imitation of natural sounds and illustration of words, with various results, but which still operate more or less on the soul through the sense of hearing; from similar relative proportions to be observed, and rightly, from the same object as poetry. If in the above accounts we substitute material parts for words and sounds, we shall nearly arrive at the theory of architecture. Architecture consists of material parts, their arrangement in accordance with the laws of proportion and taste; divisions regularly repeated through the extent of the works with due respect, as in poetry and music, to each other and the whole; delight and astonishment produced by the expression of the ideas (as before) of grandeur, beauty, and grace; the continual satisfaction of the soul through the sense of sight, and (as I think) the same object of pleasing only the better to instruct. Architecture, we repeat, consists of these. Whence it appears there is a complete theoretic analogy between poetry, music, and architecture, and partial analogy between each of them and sculpture and painting; and, taking them altogether, the principles upon which each is founded are so similar, that he who is thoroughly a master of one would find little difficulty in understanding and following the others, as has been done by many a great Italian. It results, then, that to be rightly a preserver of the other arts, so as not only not to detract from but to enhance their effect, the art we treat of should look to maintain her analogy with them, in herself following the true principles of universal art, from which thing alone can there arise a harmony between herself and the other two. The claim, then, in her office of *preserver* is, that she be true to herself. And though I deny that they are absolutely necessary to her efficiency, she would indeed be very austere without them—and lonely as a muse who has lost her sisters; and because they are protected by her, I assume their powers to be in some measure due to her, and bound to her service; and therefore what they declare in her, I shall say she declares; what they chronicle in her, she chronicles; what they attest in her, she attests.

Having seen the analogy between architecture and poetry, let us enter into a brief inquiry as to how far the former may be carried out on the principles of the latter, and let us endeavour to show how we can effect the poetry of architecture, so much debated about. On a former occasion I took a baptistery for the purpose of illustrating this matter: treating that as an embodiment of the ideas of purification, commencement, and promise, we made it a place of the dawn—we filled it with a dawn-light—we adorned it with the buds, and not the full-blown flowers. I will now take as a subject upon which some have been lately meditating—a marine palace. We have, then, to do with the sea. Now, the poets, in treating of any subject, not only endeavour to describe it by simple expression, but they aim at illustrating it in the very construction, the ornament and sound of their lines. The instances of this are almost innumerable, such as the χειει πολυηχεα φωνην of Homer's nightingale—his passage of Neptune over the sea—his description of the speed of race-horses, which we can hear, for instance, in the line

κραιπνὰ μάλ' ἔνθα καὶ ἔνθαω ἐικέμεν ἠδὲ φιβεσθαι;

many similar passages in Virgil; the whole of Milton's "Battle in Heaven," in such expressions as "down their idle weapons dropt," where we almost see the arms fall, and, before, in "sonorous metal blowing martial sounds," where we hear the trumpets; the rush of passages ending like that with "invulnerable, impenetrably armed;" the lines in the "Penseroso," descriptive of the sound of the distant bell—

> "Over some wide-watered shore,
> Swinging slow with sullen roar;"

Dante's description of the confused sounds in hell, beginning—"Diverse lingue, orribili favelle;"—all these exemplify the truth of the observation, that there is not mere verbal description attempted, but actual description of facts in the construction of the lines, and close imitation of nature. With respect to the sea, the same thing nearly always occurs; as, for instance, in Homer, Βη δ' ἀκεων παρα θῖνα πολυφλοισβοσο θαλαίσης,— in Byron's

> "Roll on, thou deep and dark blue ocean, roll!"

and more wonderfully than anywhere, in Schiller's "Diver." As to the ornament, poets choose in this case their metaphors and illustrations from the things of the sea, and those connected with it, as, in the passage of Byron above quoted, he calls ships "oak leviathans," not oak elephants, and speaks of man sinking into the sea "like a drop of rain." These are not so much instances of mere imitation of sound, so complete in music and in "Israel in Egypt," but of expression of action; of adaptation of the work to the subject.

Now, we cannot make the ear have any thing to do with architecture, but there is a vast power of appeal to the eye; and I claim a similar regard for it as hath been shown to be given to the ear. I should like a marine palace to look as if it had been founded by Neptune and adorned by the sea nymphs. Let us consider. The sea gives us the idea of vastness, boldness,—the coast (I take some part of our own) of severity, ruggedness: the sea and coast viewed together impress us with the notion of grandeur. We will not, then, think of building what we call a pretty palace, nor of florid style, nor of frittered ornament. We will have a style in accordance with the ideas we have gathered from the place. We want a grand disposition of masses, severity, solidity. We are going to build in the very face of the ocean,—our base naturally buffeted with the waves, our summit by the hurricane. Now I say, if we observe all these things, imbuing our minds with the spirit of the place we are going to build in, we carry out in our main design the poetry of architecture. As to the ornament, it should be vocal of the sea. If ever dolphins and shells are justifiable, they are so here: they belong to the place. Those only who have studied it can imagine what an infinity of beautiful things there is in the deep,—what graceful foliage, what lovely coralline trees. Under the sway of those resistless tides wave groves glorious with all that is exquisite in design. The plants of the sea (for instance, that commonly known as *maiden's hair*), are of the finest and most delicate sort; its smaller inhabitants and their shells of every variety of form. Surely, then, in the marine palace, we shall not be compelled to have no foliage but such as grows on the land; no ornament but such as the forms of the country suggest. Our capitals may find another leaf than the acanthus; our carving another elaboration than that given to the vine and the ivy. We are going to build before Neptune, and are bound to consult him. Our palace is to stand between the sea and the earth, and it should equally declare the wonders of both. If this be done, we carry thoroughly out that kind of expression which is achieved, even in words only, by the poet; we realise the poetry of architecture; we erect a palace that does belong to the ocean; that is marine, in another and truer sense, than that of being merely taken up, like Aladdin, by some ghoul of prejudice from somewhere far in the interior, far from the sea, and clumsily dropped upon the coast.

But to resume. Architecture having called upon Painting and Sculpture to beautify her by the addition of their graces, and then having availed herself of them, at once assumed several new and important offices in their name. For men naturally asked, "What shall we paint, and what shall we sculpture?" What could they do? Either simply imitate nature, or depict their manners, and illustrate their history. If in the temple, depict the story of the gods and heroes; if in the public hall, the actions of their ancestors. It is said they were ignorant of landscape painting, and what other painting there was has perished: the sculpture remains to tell us with what success men achieved the objects they had in view. The temple soon enshrined its sculptured god: its walls probably displayed his painted myth; the revelation in colours of his attributes and creed. And thus architecture assumed another office—she became a *witness* of religion—she handed down the faith of nations to their posterity—the same Minerva sat calmly in the temple as sat there before—the same Jove frowned with marble brows and menaced with his dreaded thunder, as frowned and menaced of old, when art first made him. It is a duty of your art to witness and commemorate the faith of the people among whom it is cherished. It is right that the temple should itself be a Bible in stone, an unalterable record of truth, an imperishable witness of creeds. It is right that the very walls should have an expression and an eloquence for the eye, for the eye has as great a claim to an exalted usage as the ear, and if that may without objection be the vehicle of the mind of truth—the channel by which the religious orator pours in his flood of refined speech,—so

* See vol. ix. p. 811.

may the eye be the glass through which the religious painter may let fall the lines of beauty in living representation on the soul, the gate by which the illustrative ideas of the sculptor may enter and find rest. Did the Creator exalt the ear above the eye? Meant He, when He gave us several senses, that we should learn of him but through one? Did He design in bestowing on us several faculties, that we should trust alone to eloquence to illustrate His attributes, and that of all powers, eloquence alone should teach religion, and only the ear attend to it? Never were supposition more ridiculous. But yet in our day, even concerning architecture, there seems to be an extraordinary opposition of parties under the several badges of the ear and the eye. These, delighting in eloquence, exalting it over all other things, swearing as well by the least word as by the most artfully elaborated period of their favourite pulpit orator, declaring the silent eloquence of artistic grace and symbolic ornament to be little less than accursed, may be styled the party of the ear. Those, loving symbolism to excess, greedy of ornament, pledged to display, insisting on the graces of the suggestive arts, regarding the eloquence of the preacher as dangerous, if not needless, may be called the party of the eye. The ear and the eye, the eye and the ear! and men to whom both belong rending each other in their several causes. Strange and inexplicable thing! For the soul is like one sitting in a chamber with several doors which are the senses, and through which or some of which she must be approached. Can any one show how he reaches the soul without opening any of these doors, or why the door he may best be able to open is a better one than all the rest? Hearing only is right, says the man of speech—sight, says the man of art—smell, says the perfumer; we shall soon come to touch and taste. Why, this puts one in mind of Messieurs le philosophe, le maître d'armes, and le maître à danser, in the *Bourgeois Gentilhomme*, where they dispute on the superiority of their several professions, and finally end in a general struggle about it, leaving their pupil to help himself if he can. But we have a right to avail ourselves, without abuse, of all our senses: we may look for the genius of Raphael, and hope for the eloquence of St. Paul. Architecture (and the other arts) are in peril from this absurd contest; for if it once be allowed that the cause of religion is best served by their utter insufficiency and wretchedness, then is the first blow stricken at them, then is the battering of the wall begun. We ask not in a church for gaudiness, for tinsel, for an impure and diseased decoration, for mythical monsters, for devils in stone and in paint; we seek only pure majestic beauty, chastity of design, a sacred elegance, a holy grandeur. Let none use the arts of rhetoric to destroy architecture, and her sisters; for every word the orator aims at them, every argument prepared for their destruction, will become a weapon that must slay its wielder. Eloquence is now put in this position: she is forced to say, "I am exciting, charming, persuading your senses, to make you believe they have no right to be charmed, persuaded, or excited by any one else." What is there more injurious in colour or statuary than in rhetoric? Indeed, there is more risk in the latter. For the subject of art being once well chosen it remains when executed for ever the same; but the purpose of rhetoric may be subtle and variable as the inclination of man. But we need not enter further upon this, being convinced that we have a right, under the sway of careful judgment, to use all our senses, and to submit them, by the lamp of reason, to the guidance of art. Everything may be used, everything can be abused: for us it is to use and not abuse. But are we to be cold and dumb and still? O art! art! how wert thou fallen if, of all the consoling spirits that have descended to cheer the earth, thou alone wert forbidden to worship in the temple of thy God!

Having thus shown architecture a witness of religion, we find her in another office as a *recorder* of history and chronicler of manners. Sculpture and Painting now describe in her the events of their country: Assyria, Egypt, Greece, and Rome yield us even now the records they made of their times: battles, sieges, bringings of tribute, forms of animals, nature of countries, modes of life, arms, implements, costumes, are all depicted before us, and give invaluable information of the past. In modern times the Italians have done as they of old: the portraits of the doges thronged the walls of their palace, with how terrible a significance, if there be among them the blank and the black curtain of Faliero! It was to record history and perpetuate her husband's fame that a Queen hung her walls with the Bayeux tapestry, descriptive of the conqueror and his deeds. How invaluable to the antiquary are the exquisite memorials of the Middle Ages, preserved unnumbered by the Gothic architecture throughout its whole progress! How excellent the feeling that was concerned in bestowing life and animation on the otherwise gloomy halls! Thus walls, bare and naked, are suddenly peopled with the great ones of the past, and men remember, like Earl de Warenne, the valour and virtue of their ancestors, and are exhorted to keep their honour as bright as their fathers kept their swords. It has fallen to the lot of Architecture to be the chronicler of the dead. There is little need now to speak of the tombs of the past,—to say that pagans expressed their kind of hopes in their monuments,—that Christians did so too, long since; but there is need to ask of what sort are our tombs to-day. In all matters of the dead we are notoriously behind savages; we are barbarous. Let us look into some old cathedral, and what do we see? The monuments. And what are they like? The beauty of the structure is defaced; its traceries often shattered; its walls are thronged with unsightly slabs, crowned with every variety of unsightly urn; gross pagan cupids flutter in hundreds about misplaced pediments, and preside over heathenish symbols, eloquent only of despair: here there is a collection of various arms that would suffice for an armoury; there there is every variety of vehicle—every fashion of peruke: here, amidst flags, trumpets, and medallions, stone commanders expire; there, amid books, busts, and cupids, favourite divines ascend to heaven in shrouds; and, whether it be for lost or saved, Fame blows her eternal trumpet—Fame indites blasphemy—Fame offers wreaths of amaranth and branches of palm—Fame mediates for sinners, and conducts their marble bodies triumphantly to bliss!—and it is thus in the churches of Christ that we publicly dishonour the memories of our dead! But comment is needless: it is not architecture, it is ignorance and irreverence that create these impious memorials.

We have followed architecture through her gradual developments as a provider, a protector, a preserver of the kindred arts, a witness of religion, a recorder of history, a chronicler of the dead: it remains but to say a few words on her final office of *instructor*. It is a necessity that a building which is a witness and recorder, as we have described them, must teach, if it be only through inquiry; as when a child of every generation, on entering such an edifice, asks of its parent, who has once inquired the same,—Whose portrait is that? What do these statues mean? Why are there so many columns? And let us suppose the answers to be—That is the portrait of the good Howard, who devoted his life to the wretched; or, that is the statue of Peel, who having everything he could desire, yet preferred the service of his country to his ease, bestowing on her inestimable benefits; or, this building was raised at the end of a war full of victories, and they set up a column for every victory, and engraved on the base the name of the conqueror, and on the capital some name of the God who permitted them to be won: let us suppose such answers as these, and who will tell us that child would go away unimpressed; would have no feeling of emulation, beneficence, devotion; would not understand the meaning and the purpose of the columns, and venerate the name carved in the capitals?

But in the most general sense, Art, when excellent, is, and must ever be, an instructress Art is most flourishing in the times of peace. We saw in the most wonderful exhibition of all time, how a long course of quietude has enabled our people noiselessly to perfect themselves in those matters wherein it was supposed they were behind the rest of Europe. But it is strange that in those very things the glory of this country stands with no superior, and in all that concerns our architectural decoration—in our carving in wood and stone—our working in iron and brass—we assume not the position of pupils, but of masters. For once and for ever is the fallacy refuted, that we have no taste; and the extent of our skill is proved by the immense variety of objects upon which it is triumphantly exercised. For it is the glory of art to apply the immutable principles of beauty alike to every production of nature: she can carve the lily in wood or stone, or gracefully shape it in iron, and the beauty of her work is still the same—its grace still that of the lily. What then shall we say? When is art most excellent? When, applying herself to the materials of the age, she embodies beauty in metal, porcelain, and glass, as she of old embodied, and now embodies, it in stone and wood, and proves that there is no material that can withstand her beautifying spell. The more we exercise our intellects on the works of industry, the more we devote ourselves to our calling—every longer day employed upon art; every increased exercise of thought; every mightier effort to excel; contribute surely and unerringly to the maintenance of the holy cause of peace, to the ultimate unity of men. We make Art an instructress, and she teaches peace; an exalter, and she raises our souls from thoughts of strife, to gratitude and love.

Though the picture drawn of Architecture shows how much she requires, her favour has often been attained, and is ever within the reach of hope. Hope shines ever beyond the work achieved, and beckons to a further advance: the true artist has no despair, for he knows that the inscription over the infernal gates should never brand the portals of the muses. Work is the slave of the lamp of science, but the magician who rules it is thought,—thought which creates worlds and systems in the intellect out of an apparent void,—thought which, like the still and pensive night, ever reveals to watchers the glories of the heavens, veiled, till her advent, by the glare of the joyous and pleasure-loving day. And the mind is like unto a sea, whose depth no man can tell till he fathom it: he may pass over the surface a thousand times and find it but labour lost if he will not try the waters. Can we know what is within us save we apply the test of thought? But it is for the diver to ascertain the depths—to rise with the rare and lovely pearls: it is for the thinker to sound the caverns of his mind, and to raise from them those inestimable jewels, which are as stars in the diadem of Truth.

H. T. BRAITHWAITE.

THE LIFE OF THOMAS STOTHARD, R.A.

A LIFE of Stothard, by Mrs. Bray, fully illustrated with outline engravings of his best works, has been recently published by Mr. Murray,* and will enable us to give a sketch of his career.

Thomas Stothard was the only son of a native of Stutton, near Tadcaster, Yorkshire, who, though of an old and respectable family, filled no higher calling in life than that of an innkeeper. Removing in 1750 to London, he established his business with much success in Long-acre, and it was here, August 17th, 1755, that the future Academician first saw the light. Being of a delicate constitution, he was sent, when five years old, to an uncle at York, who placed him under the care of an aged widow living in the neighbouring village of Acomb, where he gained health; and it was here, at the same time, the incipient love of art manifested itself, which led the way to his eventually becoming one of the greatest historical painters this country ever produced,—some will say, the greatest. When he was in his thirteenth year his father visited his native place, and returning to London, took with him his son, and

* Albemarle-street.

placed him at a boarding school at Ilford, Essex, but where he had not been a year before that parent died; leaving a provision for his widow, and 1,200*l.* in the Funds for his son. Thomas Stothard then left school, and lived with his mother. Having shown a great fondness and aptitude for drawing, which had first manifested itself while at Acomb, in copying some heads of Houbraken, and an engraving of Belisarius, by Strange, which were in the possession of the old lady, together with some religious pictures, it was thought desirable he should be placed in some way of life where this might be turned to advantage, and he was accordingly apprenticed, when fifteen, for a term of seven years to a designer of patterns for brocaded silks, such being then in much request.

It was not till about two years before the expiration of his indentures, when flowered silks lost their vogue, the request for designs fell off, and the profession became unprofitable, that he devoted every leisure moment to the improvement of his mind and fancy in his own way. Before Stothard was out of his apprenticeship his master died, but the widow determining to carry on the business, though with a very uncertain prospect of success, he still continued to serve her, devoting his time, after the day's work was done, to studying a translation of Homer, or Spenser, or making designs illustrative of what he had been reading. About this time he was introduced, through his mistress, to the well-known Mr. Harrison, of the *Novelist's Magazine*, which was the means of deciding his future lot in life. He now gave up all thought of making drawings for brocaded silks, and taking apartments in the Strand (1778), conjointly with Samuel Shelly, who afterwards became celebrated as a miniature painter, adopted art as a profession, living on the interest of the money invested by his father, with such additions as he could now and then make by painting portraits. It does not appear that he was regularly employed on the *Novelist's Magazine* till July, 1780, but from that period he was much engaged in the illustration of books. Another important consequence attendant on his connection with Harrison was that of introducing beautiful illustrations as an accompaniment to the popular literature of England; and in this respect he was destined to become the father of the British school. These designs are still the admiration, not only of the learned in art, but of every one having a heart alive to nature, and capable, even in a remote degree, of estimating the highest order of poetic composition. It will surprise modern collectors, who now give almost any price that may be demanded for these early drawings, to learn how little he received for them. He states in his own handwriting that "for one hundred and forty-eight designs for the *Novelist's Magazine* he received one guinea each; for twenty-six for the *Poetical Magazine* he had the same rate of payment; that for twenty theatrical frontispieces (and these were always portraits of the chief actors and actresses of the day) he received seven shillings each; and that for every separate vignette or border his remuneration was *six* shillings."

"It is uncertain," says Mrs. Bray, "whether it was before or after he lived with Shelly that he exhibited his first picture, a Holy Family, at the Society of Artists; but soon after he did so he was admitted as a student at Maiden-lane, where, before the establishment of the Royal Academy at Somerset-house, the artists held their meetings, drawing from the model as well as from the antique." We can settle this difficulty by saying he was admitted a student in 1777. "Stothard's method of study was peculiarly his own: he adopted not the practice so general with the students to sit down and draw from a single figure for six or eight weeks. He would place himself opposite to it, and in a small sketch-book would make a careful outline in pen and ink, about five inches in height. He said that he had recourse to this method, because it obliged him well to consider the lines and the proportions before they were drawn, and that thus they became impressed upon the memory. He disapproved the practice of rubbing out, and maintained that an eye and a hand well trained in making pen and ink outlines, would be characterised by truth, carefulness, and a good flow of line; in short, would be masterly. Having thus, in less than an hour's time, taken one view of the figure before him, he would change his position so as to command a different view of it; and then, being especially careful to mark the change of contour in his subject, he would begin another sketch, and thus continue to work till he produced seven or eight drawings of the same figure. He frequently remarked that any one who adopted this method of study would, after a little practice, be surprised by the knowledge he had attained. At the same time he would by no means have the student neglect light and shade, and rounding well the figure; but truth of outline in its varied form was most essential, and after having acquired it, he might pass with safety to the living model, as the imperfections of nature would be immediately discovered and corrected by the knowledge previously gained. Stothard was ever a close observer of nature; but it was nature in action that he most studied and admired, and thought that however good might be the design or the conception of a picture (frequently displayed with freedom in the original sketch), it was often spoilt by presenting in the figures which composed it, all the stiffness of the lay figure, and all the rigidity and fixed attitude of the living model from which the artist worked. He would remark, that action was momentary—it could not be fixed: to be well expressed, it must be caught at once by the mind. It is generally known that he never painted from the model; and it was after having been apprised of this fact that an eminent artist now living was heard to exclaim, "Then he stands alone; and I can now understand how it is all Stothard's works are so graceful." We are far, however, from recommending such a course. Even at Burleigh House, the seat of the Marquis of Exeter, on the Grand Staircase, where the figures are nearly 8 feet high, not one was painted from a model. Having taken to himself a wife in the person of a Miss Rebecca Watkins, and a family rising rapidly about him, he experienced the benefit of early economy and prudence in never having made use of the principal of the money invested by his father. He now turned it to good advantage in buying a larger house, freehold, which offered itself, No. 28, Newman-street; and to effect the purchase, he sold out nearly all the funded capital. His increasing family obliged him constantly to labour, and often to accept commissions of a trifling and insignificant nature, such as designs for pocket-books, ladies' fashions, and for ordinary magazines and play-books, but so great was his love of art, that he made these with the same care and put into them the same grace which he bestowed on the highest order of his works; feeling assured that "what was worth doing at all was worth doing well." In 1791 (Mrs. Bray says wrongly, 1792), he was elected an associate of the Royal Academy, and that year exhibited his beautiful picture of the Confirmation. "Thus was he fairly established in 'Artists'-street,' for in a few years so was Newman-street designated. West, the president of the Royal Academy, had lived there seventeen, and Bacon, the sculptor, eighteen years, before Stothard bought his house; and in a comparatively short period, Russell, Ward, Howard, Jackson, all academicians; Dawe, and a host of other artists, to the number of about forty, all became residents in the same street." The next memorable event in Stothard's life was, that in 1794 he was elected a Royal Academician. It was soon after his becoming an Academician that he designed those illustrations for the "Pilgrim's Progress," which, as a series, he never surpassed. From this time to his death, which took place through natural decay, in his house in Newman-street, April 27th, 1834, Stothard's life showed few vicissitudes: he pursued unceasingly his vocation as an artist (holding, besides, the position of Librarian to the Academy from 1817), and produced no less than 5,000 specimens of his power and imagination, of which some 3,000 have been engraved. "In painting, as in literature, we sometimes see, that if the artist pursues only the quiet, unobtrusive mode of presenting his works before the world—if he is not thrust into notice by himself or by his friends—if no great patron takes him by the hand, and his name is seldom seen in print; these circumstances will combine to his present injury, since his fame cannot spread whilst he is too little noticed to be known to more than the favoured few. But time will do him justice; and though the earth may have closed over him ere this take place, his reputation will not eventually suffer. The genius of Stothard, though it can only be said within the last few years to have been spoken of, as it deserves to be by the public at large, was, from a very early period, duly estimated by men of real judgment, whose praise is often the long forerunner of public fame. Sir Joshua Reynolds said, when applied to by Sir John Hawkins for a frontispiece to the drama of the "Ignoramus," "Go to young Stothard, he will design it better than I can;" and Sir Edwin Landseer remarked, on seeing his picture of "Confirmation," "Come here and look at this: nothing in beauty or grace can go beyond that." Amongst his many works may be mentioned the "Canterbury Pilgrims," which is, perhaps, the most popular production of his pencil, and for which he received but 60*l.*; designs for Defoe's "Robinson Crusoe;" illustrations of "Shakspeare;" "The Wellington Shield;" and the ceiling of the Advocates' Library at Edinburgh, not forgetting "The Flitch of Bacon," designed when he was nearly 70.

In a literary point of view the book is scarcely equal to its subject: it is, nevertheless, pleasant reading, and makes a most elegant volume,—to our liking the most elegant of the season that has come under our notice. The illustrations, from drawings by Mr. G. Scharf, nearly sixty in number (beautifully executed), are in brown ink, and the printing is of the best.

CONSIDERATIONS UPON SOME OF THE PRODUCTIONS CONNECTED WITH ARCHITECTURE IN THE EXHIBITION OF 1851.*

THE slate self-acting cisterns, shown by Struthers, were ingenious illustrations of the filtration of water by ascension: the filtering medium being packed between two pierced false bottoms, the water from the cistern at the top passed by a pipe into the fourth or bottom division, through the packing in the third, and rose in the second by the pressure of the water in the cistern, or top division. Slates were also exhibited from the neighbourhood of Stamford, and from several parts of Ireland, including Valentia, the slate stone from which is said to be non-absorbent, and to require nearly six tons as the crushing weight of an inch cube. It is raised in slabs about a foot in thickness, and, having no true cleavage, requires to be sawn. Canada also possesses this useful material, as well as Trinidad, a fact which excites some surprise, when we recollect that large quantities of shingles are sent to the West Indies. It is, I presume, a recent discovery. The United States, Nassau, France, and Sardinia, were the only foreign countries which showed slates: from the latter there was a slab about 5 feet 6 inches square. France sent a slate billiard-table, and some fine slabs, 5 feet 6 inches by 3 feet 11 inches, by $\frac{3}{4}$ inch thick. The slate company of Angers, which manufactures 130,000,000 of slates, like those of Cornwall, and the slate company of Rimogne, exhibited each a series of the sizes usually made. The slate of the latter company is remarkable for its tenacity and strength: by exposure to the open air it acquires increased hardness and consistency, its surface becomes polished, and upon being struck it gives out a clear metallic sound. The joints of slab

* The following is part of two papers read at the Ordinary General Meetings of the Institute of Architects, Nov. 17 and Dec. 15, 1851.

roofing are generally made with tongues in grooves set in cement, covered by ribs; but it is difficult to make a joint that will stand, on account of the material swelling and shrinking like glass: at all events, it is disturbed by the slightest settlement. Attempts to remedy this disadvantage were exhibited in Taaffe's patent, and in the so-called improvement on the same, by Russell, in both of which the principle of I cramps and screws, or nails, with zinc gutters under each line of junction of the slate, is adopted. No arrangement, however, appears to me so good as that of lead drawn in grooves, and covered by ribs set in putty on the slates, screwed down to the rafters; as no gutters are required, and holes in the slate are avoided as much as is possible. The patent slate ridges and hips seemed well contrived. It will be seen that I place no reliance on constructions of iron and slate, except under shelter, or in very peculiar circumstances.

Passing for the present the imitations of marbles, we may notice those of stones. Ransomes' patent stone differs from cements and other artificial stone in the employment of silica, both as the base and the combining material. It may be regarded as a collection of particles intimately combined with silicate of soda, by which they are held together as by a kind of glass. Another manufacture consisted of an admixture of caustic carbonate of lime (with or without magnesia), and silica in a gelatinous state, which produced a hydrous silicate of lime as a result. The largest collection in illustration of this branch was shown by White and Sons, and was divided into two classes—the natural and the artificial. The first consisted of Sheppey stone, and nodules dredged up off Harwich, from which respectively are obtained the varieties of the article known as Roman cement, introduced by Dr. Parker about fifty years ago. These stones, as well as those from Christchurch and Romsey, which yield the Medina cement, are found among the older tertiary deposits. The Whitby stone is found in the lias formation, and gives the cement, known as Atkinson's. At Wolverhampton and in Derbyshire, cement stones occur in connection with iron stone, which imparts to them a ferruginous tint. Other districts yield natural cement stones; but the above-mentioned are those which are best known in commerce, being extensively used both for mortars and stucco. The name of Greaves is intimately connected with that of blue lias lime; and this material was abundantly represented in the Exhibition. The artificial cements, composed of a mixture of carbonate of lime and argillaceous earths calcined together, were chiefly represented by the so-called Portland cements, furnished by White and Sons, and by Robins, Aspdin, and Co. The first-named firm exhibited the celebrated brick beam, and specimens of concrete, consisting of one part of cement to ten of gravel: the second showed several instances of tests of strength of the cement, pure and mixed with sand; but as some of the statements made since the exposition vary considerably from those which I noted, I have put them aside. The inutility of the experiments, made with much parade on Portland and Roman cements, is apparent when we consider that a single trial, under complicated conditions, can never be taken as affording a quotient for use as a constant in calculation, and that we have had no series of experiments made by rival manufacturers on the same day and in the same place and manner; and that, moreover, the results so obtained can only show the properties of the best materials supplied by the manufacturer, while no architect can tell with certainty on every occasion what cement the workman uses. Hamelin's mastic seemed to be wholly unrepresented or forgotten. I do not exactly know where to place what was called "cement-stone," a limestone believed to be the basis of Peel Castle mortar; a cement made from the "curl-stone," found at Coal Port; Dyer's patent metallic cement; Furze's fusible mineral cement; Orsi and Armani's patent metallic lava, nor Spence's patent zinc cement. The latter should be inexpensive, as it is manufactured entirely from refuse matters. Among the British possessions, New Zealand sent a Roman cement stone; and France two hydraulic limes. It was said that by the process of M. Henri de Villeneuve, engineer, a superior hydraulic lime might be obtained from all carbonates of lime, without the addition of other substances, and that the cement exhibited possessed different degrees of rapidity in setting. Belgium also sent a hydrofuge stucco, or plaster; Holland a hydraulic cement; and Wurtemburg, "a hydraulic chalk cement, hardening under water in a few minutes." Portugal presented hydraulic clays from the Azores, and hydraulic scoriæ, by which, with the addition of lime, "a hydraulic bitumen, called Argamassa cement," is produced. From Prussia, we received a "Roman cement," being an argillaceous carbonate of lime with magnesia: the double silicate may probably be of very great solidity. Ant. Peppini of Florence displayed some neat octagon paving squares, "in cement, called Calcarea." The renowned Roman hydraulic cement is said to have been made of a mixture of volcanic sand and lime. I did not notice pozzolana from the Papal States, Tuscany, or Naples, although I believe there were specimens. Greece sent a box of this volcanic earth (a silicate of magnesia?) from Santorin, which was ash-coloured, and said to have the same qualities as the Italian: mixed with lime it solidifies and sinks in water. A considerable quantity is exported annually to Turkey and Trieste. Spain also claimed to exhibit this material, but gave it the alias of soapstone of Somontin. The United States also sent steatite, or hydrated silicate of magnesia, combined with a little alumina and oxide of iron: its peculiar greasy feel has been the origin of the name of soapstone. It is much more abundant, and more extensively used in America than in England; and being almost as readily worked as the soft woods, and with similar tools, it is applied to many purposes for which its superior durability renders it preferable, as baths and the jambs of fireplaces; and it is used in Switzerland for stoves of superior quality. Large beds of the pure material are found in the English possessions in Canada. The terms, mortar, stucco, and cement are at present so indiscriminately employed as to cause considerable confusion, and a strong feeling of the necessity of some authoritative scientific lexicon. I shall pass a few specimens exhibited, for the third great division of imitative stones. Gypsum, or hydrous sulphate of lime, called alabaster when in a semi-crystalline form, and selenite when in crystals, being heated from 250° to 275° Faht., becomes an anhydrous sulphate, and, reduced to a fine powder, furnishes the plaster of Paris of commerce. The peculiar stone obtained from the tertiary deposits of the Paris basin contains above 7½ per cent. carbonate of lime, and 3 per cent. of clay, which so greatly improves the cement as to have given the peculiar name to the preparation in other countries. The genuine article from Paris was submitted, as well as supplies from Ireland and Canada. The English sources are chiefly in Derbyshire, Nottinghamshire, and Cumberland; and when combined with alum, the products are the hard artificial cements known as Keen's and Parian patent cement. The effect of the last, vitrified, is exceedingly good. Gypsum is also understood to be the basis of Martin's cement. Of these rivals, we shall all recollect the handsome specimens which were exhibited. It will hardly be supposed, that of all foreign nations Tunis supplied nearly the most interesting examples of this material. The wall decoration, closely resembling that of the Alhambra, hardly seemed to be a cast, and was remarkable for the way in which the top surfaces were modelled so as to be relieved easily from the mould, and to show to advantage either on a level with, or above the eye. Spain sent an original piece of the Alhambra wall decoration; and Don Rafael Contreras, of Aranjuez, exhibited a portion of his copy of all the Alhambra work of this kind in the same material, one quarter of the real size: such a collection has rarely, if ever, been formed.

We may divide the subject of coloured glass into four modes of manufacture, viz.,—stained, or flashed; solid, or pot; enamelled; and etched glass. Without touching, it was very difficult to decide how some specimens were executed: those by Chance and Co. obtained my highest approbation for the quality, too often lost, of lucidity; and I think they consisted chiefly of flashed glass, cut, where requisite, to produce the lights. The specimens by Hall and Sons were also very satisfactory. I noticed no foreign glass of this sort. Hedgland, Hardman, and Co. and Gaunt exhibited works in the antique style; and I observed a window from a very clever design by T. T. Bury. The Belgian and French were single specimens of the second division of manufacture: the latter, consisting of works for Ely Cathedral, by Gerente, seemed poor and ineffective. The work by Toms appeared very good in taste and execution; and I must group together here the names of Ballantyne, Claudet, Hetley, and Wailes, with one exhibitor from Austria. All these seemed to present a third class of work, partly stained and partly painted glass. The enamel school, I think, included Messrs. Baillie, Bland, Gibbs, Gibson and Toby, the St. Helen's Co. (whose taste I question), two clever examples from Austria, one from Saxony, a good specimen from Holland, and five from France, of which I can say nothing favourable, but that No. 229 was perfectly a picture, and that Lasson's work contained a beautiful female figure, and was in all respects more in accordance with our notions of glass-work. The American glass, as white glass, appeared to me to be, without exception, the finest that I had ever seen for material, but very badly manufactured. The numerous varieties of glass decorated with opaque patterns, embossed or marbled, differed in no respect from that which we see daily advertised. Chance and Hartley stood pre-eminent for their window glass. The French glass, the Belgian, and the Prussian followed in the order of merit in which they are mentioned: the Bavarian was indifferent. Glass tubing seemed to have attracted much attention, both in Holland and in England: metallic joints seemed generally to be contemplated, but I apprehend that the recent introduction of vulcanized india-rubber to form the joints of iron pipes, is equally applicable to those of lead, terra-cotta, stone ware, and glass. Except Swinburne's glass domes, I did not observe any glass for ordinary use, as tiles in roofs, on the English side. France sent some, 15 inches by 9 inches, under the name of Francis Fox, with terra-cotta tiles, 14 inches by 9 inches. Prussia sent glass-tiles and pantiles; and Brunswick exhibited glass tiles, very good glass slates, and excellent lace glass. Before quitting the subject, it may be remarked, that the artists of the Mediæval ages, being much more moderate in their demands upon their material, were more primitive, and, perhaps, more successful than their modern rivals in the effect produced, while their successors have certainly advanced in an artistic point of view, but at the expense of transparency, breadth, and simplicity. As a general rule, the modern works are too much paintings, in the strict sense of the word, too opaque in their shadows,—in fact, too much shaded; whereas painting on glass, to be really effective, should be almost entirely outline and colour, and as free from non-transparent shading as possible, for this becomes a sort of neutral tint when opposed to the light; hence the muddy character of much modern glass. I think it must be borne in mind that a stained glass window is a means of admitting modified and tempered light into a building—hence it must be transparent; that the picture is to be seen from a distance, generally considerable—hence that boldness, breadth, and harmony are more favourable to its effect than minute detail; and lastly, that the artist is not producing a work for isolated exhibition, but is labouring in combination with the architect of the edifice which he is to adorn, and with which his work is expected to harmonise, not to jar and contrast by painful and violent effects of light and shade; in short, that the window ought never to lose for an instant its character as a window, that is, a means of admitting light, which is its absolute

and æsthetic relation to the chamber which it illuminates. Enamel painting on glass is decidedly pushed much further than in former times, but we must doubt if it has advanced in its legitimate object, that of an adjunct to architectural effect.

Terra cotta, as a decorative adjunct to buildings, is one of the objects which the Exhibition was well adapted to bring under notice. After the progress made of late years, particularly by the firm of the Ladyshore works, it might seem remarkable that the combination of elegance with durability which it offers, should not have secured employment of the material commensurate with its capabilities, did we not call to mind the competition with which it has been met by the makers of artificial stone, and which has prevented its adoption for reduplications of a pattern.

Other difficulties arise from the very nature of the processes to which it is necessary to subject each branch of the manufacture, for we may regard the term terra cotta, in its most extended sense, as including even the finest porcelain. The component parts of the usual terra cotta are potter's clay, fine sand, and pulverized potsherds, mixed with water and thoroughly incorporated, and either modelled or cast in the state of a thin paste, in porous plaster moulds, which absorb the moisture. After air drying, the objects are baked in proper kilns at a very high temperature, during which process the shrinkage is sometimes very great. It is foreign to our purpose to enter into a detail of the different gradations in manufacture which exist between terra cotta, as baked fire clay, and porcelain, but all of them are subject to the inherent defects of contraction and distortion. The naturally abundant distribution of the clays which are found underlying coal seams in the colliery districts conduces much to the extensive application of the material, which, for the purposes of ornament, is gradually recovering the importance which it acquired in Italy, France, and Germany, from the fourteenth to the sixteenth centuries. Besides the productions of the Ladyshore works and other firms, a kind of perfect pottery, salt glazed and very nearly approaching to a true porcelain, was shown in the shape of drain and water pipes, vases, garden pots, architectural ornaments, and cases for plants, constructed upon Ward's principle. A bath, of the usual adult size, made in one piece of fire clay, plated with porcelain and glazed, was also exhibited. These baths are at present much used in public as well as private establishments, and I may observe that although they will bear a heavy blow without injury, yet they are liable to crack on the first inlet of hot water, if they are bedded solidly or fitted tightly: they should therefore stand on piers or bearers, and be free from anything which may prevent the expansion and contraction of the material. An Ionic capital for Cliefden House, a Gothic pinnacle for a chapel at Tottenham, and some samples of "Parian" vitrified, seemed to promise well. In my own experience I have found that articles badly manufactured in terra cotta are likely to scale away on the surface, a defect which arises chiefly, if not always, from an improper mode of filling the moulds.

J. W. PAPWORTH.

NATURAL GAS JET.—In sinking for water at Chat-Moss a few weeks since, a stream of gas was got instead, which has ever since burned with a flame, extending to a height of 8 to 9 feet from a pipe 35 feet in length above ground, through which it has been conducted. This is not the only gas-jet of gigantic size running to waste in this country. There is one near Newcastle, which has blazed away for many years, and which it was some time since proposed to turn to useful account in street-lighting. If the one at Chat-Moss be likely to last, might not Manchester or Liverpool reap the benefit of it through a main run along the railway? Since writing the above we are led to understand that the jet at Chat-Moss has been put to use in heating the boiler of a steam-mill.

CONDITIONS IN SPECIFICATIONS.

"A BUILDER," sends the following extracts from the specification of a building about to be erected; and evidently regards the conditions they contain as altogether tyrannical:—

I. "All works to be done under the direction, and to the satisfaction of, A. B., Architect and Surveyor, or, in the case of his decease, of any other that the committee may appoint."

Here there is of course nothing to complain of. Individuals, or committees, having occasion for the professional intervention of an architect, are entitled to be satisfied as to the quality of the article to be paid for; and certainly that can only properly be through their professional friend or employé.

II. "The several works to be executed to the true intent and meaning of the drawings and such other details as may from time to time be furnished by the architect."

The details referred to are plainly enough "parts at large" of those works only which are set forth in the general drawings. As "other details" is the expression, we presume that a fair quantum is already given, sufficient to indicate their average degree of elaboration: if such is not the case, the contractor is reasonably entitled to look for them before binding himself to a price. Where details are given out by the architect piece-meal, after the contract is taken, dissatisfaction is very liable to spring up, and disputes ensue.

III. "In case any dispute should arise touching or concerning this contract, the matter in question shall be referred to the said A. B., whose decision shall be binding on all parties."

The carrying out of structural schemes is the natural and proper province of the architect; between whom and his immediate agent, the builder, an honourable confidence must subsist. When the former is so qualified that he can furnish his drawings and specifications so complete as to obviate all questions, and the latter makes his estimate with such care that out of a conscientious fulfilment of his contract he shall earn a fair profit, there can no harm accrue to the builder from the solution of difficulties resting with him who contrived the work in all its minutiæ. The contractor's undertaking being an onerous one, he should take care and enter upon it with his eyes open. The substitution of an *arbitration clause* for this sole reference to the architect engaged for the employer, has been insisted on by the leading builders of the metropolis, and where large interests are at stake may reasonably be desired. The "Builders' Society," if we mistake not, was originally formed for the purpose of carrying this point.

IV. "Should anything be shown in the plans and not described in the specification; or anything described in the specification, and not shown in the drawings; or anything omitted in both which the architect may deem necessary for the completion of the several works in the design, the contractor is to execute the same in such manner as shall be directed by the said architect, and the same shall be included in the amount of contract."

The two first clauses here are reasonable: the two classes of documents, the drawn and the written, must be regarded together, and everything which they collectively demand be taken into consideration in the first instance and complied with. The third savours of the arbitrary, and might be unduly stretched, although the thing deemed necessary were only *for the completion of the design*. Were only a library chimney-piece, for example, forgotten both in the drawings and specification, there might be a wide difference of opinion as to the material and the amount of art-labour proper for it.

It is the duty of an architect to make his drawings and specifications so complete and clear that contractors, fully understanding the intention, may allow in their estimates neither too much nor too little for it; and then, on the other hand, it is the duty of the contractor to carry out that intention fully, and co-operate honourably with the architect in producing a satisfactory result.

AMERICAN NEWS.

Tremont Bank, Boston.—The corporation of the bank have just completed a new building for business on the site of the old one in State-street. The new building extends from State-street to Post-office Avenue (a depth of over 130 feet), and is four stories high. The front is of Connecticut sandstone, in the Italian style of architecture, and of the Palladian school, though the cornice is nearly a copy from one of Vignola's. The first story is a series of three arches with rusticated piers and voussoirs, surmounted by a stone balcony: the second story windows have moulded architraves and pilasters and carved consoles, supporting circular and triangular pediments: the third story windows are finished in the same manner, but with horizontal cornices, and a stone balustrade before each window: the fourth story windows have architraves only, but broken at the angles of the opening, and surmounted by horizontal cornices. The design is suitable for a more extended front. The building was erected by Mr. F. W. R. Emery, and the design was made by Mr. Charles E. Parker, of the firm of Bond and Parker, architects, all of Boston.

Fresco Painting. — Much progress, says the *Boston Transcript*, has been made in our country within a few years in this art. Our churches have many of them been relieved from their previous barn-like appearance, and the impression conveyed upon entering them made more compatible with the purpose for which they are intended. And no one has done this to greater perfection than our own countryman, Whittaker. We found him the other day at Thorndike Hall, putting on the finishing touch, and but lately returned from a visit to the Crystal Palace, and to the best specimens in his line in La Belle France. It is evident to many that stucco, costing ten times as much as fresco, will not prove so satisfactory as the latter, as recesses, projections, &c., giving walls and ceilings uneven surfaces, do not reflect sound so well as smooth and even surfaces, and consequently those churches and halls finished in fresco are always preferred by speakers and musicians to those richly finished in stucco. Mr. W.'s services have been so much in demand for the last five years, that some portion of the time he has not been able to execute orders short of a year's notice. [We suspect it is not *fresco* after all that is spoken of.]

Electro-telegraphic progress.—The *Commonwealth* states that there are already in the United States and Canada more than 12,000 miles of wire, involving a capital of 3,000,000 dollars. To work these lines costs annually 720 tons of zinc, worth 57,000 dollars, more than a million pounds of nitric acid, worth 117,800 dollars, and 27,000 dollars' worth of mercury, besides a considerable value in sulphuric acid, &c. [These statistics may show what amount of saving would be effected by the substitution of the magnetic telegraphic for the electro-magnetic.] On the line from Pittsburg to Cincinnati alone there were transmitted, in the year 1850, 364,559 paid despatches, and the revenue received was 73,278 dollars.——A correspondent of our own informs us that the suggestion of a telegraphic fire alarum for towns, made in our pages, has been already carried out by the city government of Boston, and is now in successful operation, the telegraph giving the alarm to every engine house and church bell over the city, as well as to the mayor's and city marshals' offices.

Smithsonian Institute, Washington. — The building designed for the accommodation of the Smithsonian Institute is rapidly approaching its completion. The external part of the work is entirely finished, with the exception of a single tower, and the interior of the building is making good progress. Mr. Downing, a writer on ornamental landscapes, &c., is laying out the extensive grounds attached to the Institute, and planting them with trees and shrubbery. The whole surface has been drained and subsoiled, and it is intended to form, with these grounds, one continuous park, extending from the Capitol westward to the Potomac. This area will include the site of the Washington

Monument, and will form one of the most extensive parks in the States.

New Model for Fast Steam-ships. — The Washington correspondent of the *Atlas* (American paper) says:—"There is a drawing in the Navy Department of a new steamboat, which is about to be built in New York for the Hudson river, and is intended to compete with the New York and Albany Railroad. Her proportions are as follow:—length of keel, 500 feet; length of deck, 350 feet. She looks like a sword-fish. There is 75 feet of keel at each end, extending out from the deck, which shows itself above water, and which is sharp and pointed like the sword of a sword-fish. Both ends of the boat are alike, and her engines are to work both ways, the vessel not being intended to turn round, but to work like a ferry-boat. She is to be called the *George Washington*, and to have accommodations for 3,000 passengers. The passage of 150 miles (between New York and Albany) will be made in five hours. She has been designed and modelled by Mr. Davidson, of New York."

TRANSCENDENTALISM OF ART.

BY GOETHE.*

As we are convinced that he who examines the intellectual world and becomes conscious of the *beauty* of the truly intellectual, will surely also perceive *her* origin, exalted above anything connected with the senses; so we shall endeavour to understand and express to our satisfaction, as far as this be possible, in *what way* we may be capable of comprehending the beauty of the mind and world.

Let us, therefore, suppose two stone masses to be placed near each other, of which one has remained rough and without artistic elaboration, the other converted by art into a statue either of men or gods. If it were one divine, it might represent a grace or muse; if one of human character, it would not be that of an individual human being, but rather one which art has created by a combination of the beautiful.

Then the stone, which art has converted into a beauteous form, will at once appear beautiful; surely not because it is a stone, else the other mass would also be esteemed beautiful, but because it possesses a form which art has impressed on it.

It was, however, not the matter which possessed that form, but this existed in the inventor (*Ersinnenden*), before it reached the stone. But this did not exist in the artist, because he was in the mere material possession of hands and eyes, but because he was imbued with *art*.

It is in art, therefore, that a still *greater* amount of beauty is recondited; because it is not the form reposing in *art*, which reaches the stone, but it remains there unalterable, and one of a subordinate kind arises, which does not repose purely on itself, nor is it that as the artist *imagined* it—such a one, in fine, as art can, in any way, impose on inanimate and tangible matter.

But, if art even reproduce that which it really *is*, and reproduce the beautiful according to reason, upon which alone it ever can draw, then it is indeed *this* which possesses in its essence a greater and more sublime beauty of art—more perfect than anything which ever can appear outwardly and tangibly.(!)

Because, as form transgressing into matter becomes already extended, it becomes of necessity weaker than *that*, which remains one and unchanged. Because, whatever endures a distancing in itself, secedes from itself—strength from strength, warmth from warmth, power from power, and the same, beauty from beauty. Thence the creating must be superior to the created. Because it is not primordial but concrete music which constitutes the musician—and transcendant harmony produces music enveloped in tones of the senses. But if one would despise art as merely imitating nature, he may be told that the complex of natures (*die Naturen*) are also imitating potencies; that, in fine, art does not exactly imitate what we see with eyes, but draws on that reason by which nature itself is constituted, and according to which she acts.(!)

Furthermore, art produces many things out of itself, and adds, on the other hand, where nature especial may appear incomplete, art being the exponent of absolute beauty. Thus, Phidias could form the god, although he did not imitate aught sensibly visible, but imagined to himself how Zeus would have appeared if he were to meet our eyes.

Idealists of olden and modern times are not to be blamed if they insist so strongly on the consideration of "the One," whence everything arises, and to which everything ought to be again reduced; because, really, the vivifying and arranging principle is so shackled in its external apparition that it does not know when and where to escape. But we wrong ourselves on either side, if we reduce the forming principle and the higher form itself to unity, which then escapes as well our outward as inward senses.

* Translated for the first time from the German of Goethe. "Posthumous Works," vol. ix. p. 104, ed. 12mo.

A MACHINE FOR CLEANSING CHIMNEYS.

MANY attempts have, of late years, been made to *do away with* that most *revolting* and *degrading*, not to mention *cruel*, employment of "Chimney-sweeping," by means of climbing-BOYS. An "Act of Parliament" was some time ago passed, imposing a fine on every "Householder," who should suffer his chimneys to be swept in any other way than by a certain "machine," invented for the purpose. This machine has been found *inoperative* in many cases, and totally useless in others, where there is any flexure of the flue. Consequently, the "Act" cannot be carried out in its full force, and the evil that existed still remains unredressed.

To obviate this difficulty, and to enforce the penalty of the law in every case of its infringement provided the machine I have to suggest be found to answer, has occasioned me, with feelings of humanity and kindness towards that class of society, to turn my attention to the subject.

The machine I have devised may be thus described:—An air-tight bag, made of "Mackintosh-cloth," 3 ft. by 2 ft. wide, and covered over with a texture having strong *bristles* or *split whalebone* interwoven in it: to this is attached a tube of "*gutta-percha*," 40 feet long, and 1 inch diameter, having a brass screw-joint at one end, and another in the middle, with an inflating valve at the end, or it might be a smaller tube, encircled by cord to give it stiffness. A pair of strong kitchen bellows will be required to inflate the bag.

CLERICUS.

GAS AND WATER SUPPLY.

Newport (*Isle of Wight*).—The New Gas Company, in the course of putting down their iron pipes in High-street, laid open several of the old wooden pipes laid down in 1623 for the purpose of bringing water into the town, and in one part of the street they were obliged to dig up a large elm tree in tolerable preservation which had been used for this purpose.

Portsmouth.—We are glad to find the subject of gas-lighting still in the hands of lecturers, and engaging the attention of the general public, in our provincial towns. On Friday fortnight a lecture was delivered to the members and friends of the Portsmouth Philosophical Society by Mr. G. Garnett, on "The Philosophy and Practice of the Gas Manufacture." The lecturer described the chemical constituents of the various descriptions of coal, gave an outline of the manner in which gas is generated and purified, and showed the necessity of chemical knowledge on the part of the manufacturer. A cordial and unanimous vote of thanks was given to the lecturer for his address.

Dudley.—The Dudley waterworks are to be supplied on a plan suggested by Mr. M'Lean, the lessee of the South Staffordshire Railway, for raising water from the Trent, and other intermediate places, and passing it through pipes alongside the railway, delivering it into a large reservoir situate on the Brown-hills, near to Ogley-hay: from thence it will run by gravitation along the line of railway into the heart of the district, and with little deviation into the company's reservoir at Parkes-hall supplying on its route the towns of Walsall, Wednesbury, Hill-top, West Bromwich, Darlaston, and Bilston; Great Bridge, Tipton, and the high districts of the country (as Dudley and Brierley Hill) from the present plant and engines at Parkes-hall. The requisite notices to Parliament have been given.

Oxford.—The preparations for the establishment of a new gas company appear to have induced the old company to issue a circular, intimating that a further reduction in the price of gas will be made from Lady-day next. It is said that the intended reduction will be something like 12½ per cent. The present price is 6s. 8d. per 1,000 cubic feet.

Luton.—The gas question is at present agitating the population of Luton, and we are pleased to observe that here, as in various other quarters, the local Board of Health is promoting the extension of cheap and good gas light. Fresh main pipes are being laid down to carry out the views of the Board of Health, and now the company, it is said, can furnish all the old customers, and as many new ones as choose to burn their gas. The gas is said to have been much improved since the agitation began: it is described as being made from a proportion of Cannel coal; its specific gravity ·481, and its illuminating power far above the average of gas usually supplied.

Darlington.—Mr. Mason, town surveyor of Darlington, in a report to the Local Board of Health on the Gas question, says:—"In this locality, where coal is cheap, and the facilities for disposing of the residual products great, I think gas can be made (and sold we presume) for 4s. per 1,000 feet, including 10 per cent. upon the capital; and in this I am borne out by the cost at other places. In Liverpool, where coals are 15s. per ton, gas is made (sold) at 4s. 6d. per 1,000 feet, inclusive of 10 per cent. dividend: at Manchester it is sold at 3s. 9d. to private consumers: at Wakefield, the company make gas at 2s. 2d., exclusive of interest, coals being 4s. 8d. per ton. In Wakefield prison, the gas is made at 1s. per 1,000 feet including 50*l.* per annum allowed for wear and tear. At a private establishment near Leicester, where coals are 10s. and 11s. 6d. per ton, gas is made at 2s. per 1,000 feet, with 40*l.* for wear and tear. At Wolverhampton, the prime cost of 1,000 feet is 3s. 2d. exclusive of interest—coals 11s. 6d. per ton. At Brentford, the prime cost is 3s. 3d.—coals, 23s. per ton. At Bristol, the prime cost is 3s. 6d.—coals 11s. per ton. At Croydon, 2s. 6d.—coals 24s. per ton. At Warrington, the prime cost is 3s. 2½d.—coals 11s. 4d. per ton: quantity made, 13,900,000 feet. At Ashton, the prime cost is from 2s. 4d. to 3s.—coals 12s. per ton. At Worcester, the prime cost is 2s. 5½d.—coals 13s. 1½d. per ton. The average of these nine towns is 2s. 9¾d. per 1,000 feet, exclusive of interest."

THE RECIPIENT OF THE GOLD MEDAL FOR SCULPTURE. — The *Bridgewater Times* says of Mr. Summers, who obtained the gold medal at the Academy,—"This talented young artist, who five or six years ago had no higher ambition than carrying mortar to the mason, and being useful in a mason and stone-cutter's yard, had awarded to him last week, at the annual exhibition of the students connected with the Royal Academy, London, the customary gold medal, given to the most successful competitors, along with a sum of 50*l.*, to enable him to prosecute his studies by a sojourn among the ancient artistic remains of Italy. In addition to this extraordinary success, this young man carried also away from his fellow candidates the next best prize, consisting of a silver medal, for another and distinct specimen of art—a feat which, it seems, was not accomplished by the great Chantrey himself, and is without an example in the history of the academy." The subject of Mr. Summer's first piece, which gained the leading prize, is "Mercy pleading for the Vanquished."

CATHEDRAL OF SPIRE.

HAD imperial Rome left no other mark to record amongst the nations her almost universal sway, the history of architecture would testify to the extended influence of a people endowed with noble feelings and high powers. With the decay of the Roman Empire declined the arts it had fostered. Architecture, true to its trust as the parent art, yet lingers on the stage when the excellence of painting and sculpture has ceased, and then passing in silence through ages of darkness and barbarism again appears to herald their return, and prepare for their reception; when a more universal, a more gentle sway than that of Rome, whose power was in the hearts of men, and not in outward coercion, came to be extensively acknowledged. Yet, after centuries of desolation, the impression of the Roman mind is strong on the works of their successors. Like bulwarks of their new faith, some of the earliest and noblest efforts of the parent art arise, beneath this new influence, on the confines of the fallen empire, and from these strongholds, as from fountains, the influence of the new dominion is poured out to lands untouched by Roman prowess.

The numerous specimens of this stage of the art, which on the continent have been preserved to our own day, cannot fail to inspire us with veneration for the talent which designed, and the energy which executed such vast and imposing works, amidst the turbulence and ferocity of a semi-barbarous population. Of this class, the cathedrals of Mayence, Worms, and Spire are fine examples. The dates of their erection seem to be in succession from A.D. 900 to A.D. 1050, their succession in date corresponding with their position at nearly equal distances apart on the right bank of the Rhine, ascending from Mayence. Following this rule, Mayence, as the first in date, and the first in position, has been most affected by the operation of the succeeding styles. The plan is nearly the same in each instance,—a long nave with aisles, short transept, and an apse at both the east and west ends. The exterior compact and solid in appearance, yet varied in outline by numerous towers of simple form. The interior plain and severe, but massive and solemn. The details strikingly classic in form. The whole grand and imposing to a degree, not surpassed by the bolder imagination and more subtle beauties developed in the productions of later ages.

The erection of Spire Cathedral, which is here illustrated, is attributed to the Emperor Conrad II., called the Salic, who resided at this city. He commenced his reign A.D. 1024, and the building was not completed till the close of that century, during the reign of his grandson Henry IV., who shortly after lost his throne by the arms of his rebellious son and successor Henry V. The city at this time seems to have been of great importance, and the residence successively of several emperors. It was here (A.D. 1146) that St. Bernard, abbot of Clervaux, by his eloquence engaged Conrad III., with many nobles, to proceed with Louis VII. of France, on the second crusade. In 1246, the Bishop of Spire, with five other ecclesiastics, were sufficiently powerful to defy the vengeance of Frederic II., an energetic prince, by crowning, in obedience to the commands of the Pope, a rival candidate for the imperial title. Ten years later the city associated itself with Frankfort and others, for the extermination of the robber nobles who impeded the freedom of traffic on the Rhine. In 1390 it was the scene of a disgraceful massacre and pillaging of the Jews (who in a great measure conducted the trade of the city) to procure money to satisfy the demands of the papacy, then shared by two rival Popes. Until 1688 the Cathedral appears to have escaped wilful injury; but in that year it was partially destroyed by the troops of Louis XIV. of France. It was again devastated by the French revolutionary forces at the end of the last century. By these two misfortunes it was deprived of the most interesting of its ancient monuments. The crypt beneath the choir is said to contain the remains of the founder, Conrad II., and eight other emperors, including the famous Rodolph of Hapsburg, the founder of the House of Austria (who died at Germersheim, distant about 3 leagues from Spire), and Adolphus of Nassau, who followed in the empire, and was killed in battle near the city by the sword of his successor Albert I., who in his turn (A.D. 1308) fell by the hand of an assassin, his own nephew, and here lies quietly by the side of his rival. G. M. H.

LABOURERS' COTTAGES.

MR. WILLIAM CHEFFINS, surveyor, has published in lithograph, plans, elevation, description, &c. of a pair of cottages, estimated to be erected in the neighbourhood of London for 180*l.*, or "on an estate which can furnish stone or brick, and tile, and fir, elm or poplar timber, not exceeding 150*l.*" The design affords, to each cottage, seven apartments, with the various appropriate conveniences, having separate bed-rooms for the parents, boys, and girls, and is well calculated to promote the physical and moral health of the occupants. The author's views are well set forth in the description: the following extracts contain some proper suggestions:—

"In some situations, a brick oven should be built in the outhouse, for the joint use of the cottages; and, if rightly placed, one of very moderate size will be sufficient for six or even twelve (?) families.

In the country, the supply of water principally depends on springs and ponds, which, besides being very precarious, often entails much labour upon the wife and children, and encourages a disinclination to fetch more than is absolutely necessary. If water can be found within a depth of 30 feet, a well and pump for two or more cottages is not an expensive concern.

For each (in a district where the lower estimate would apply) a rent of 1s. 6d. per week will be gladly paid, and a return of 5*l.* per cent. realized on the cost, including a good rent for the 30 or 40 perches of land allotted to each. In and near towns, 3s. or 3s. 6d. per week will be readily obtained, even without a garden, and a very remunerative return secured for the capital invested."

INTEREST OF PRINCE ALBERT IN CONSTRUCTIVE AND MECHANICAL SCIENCE.

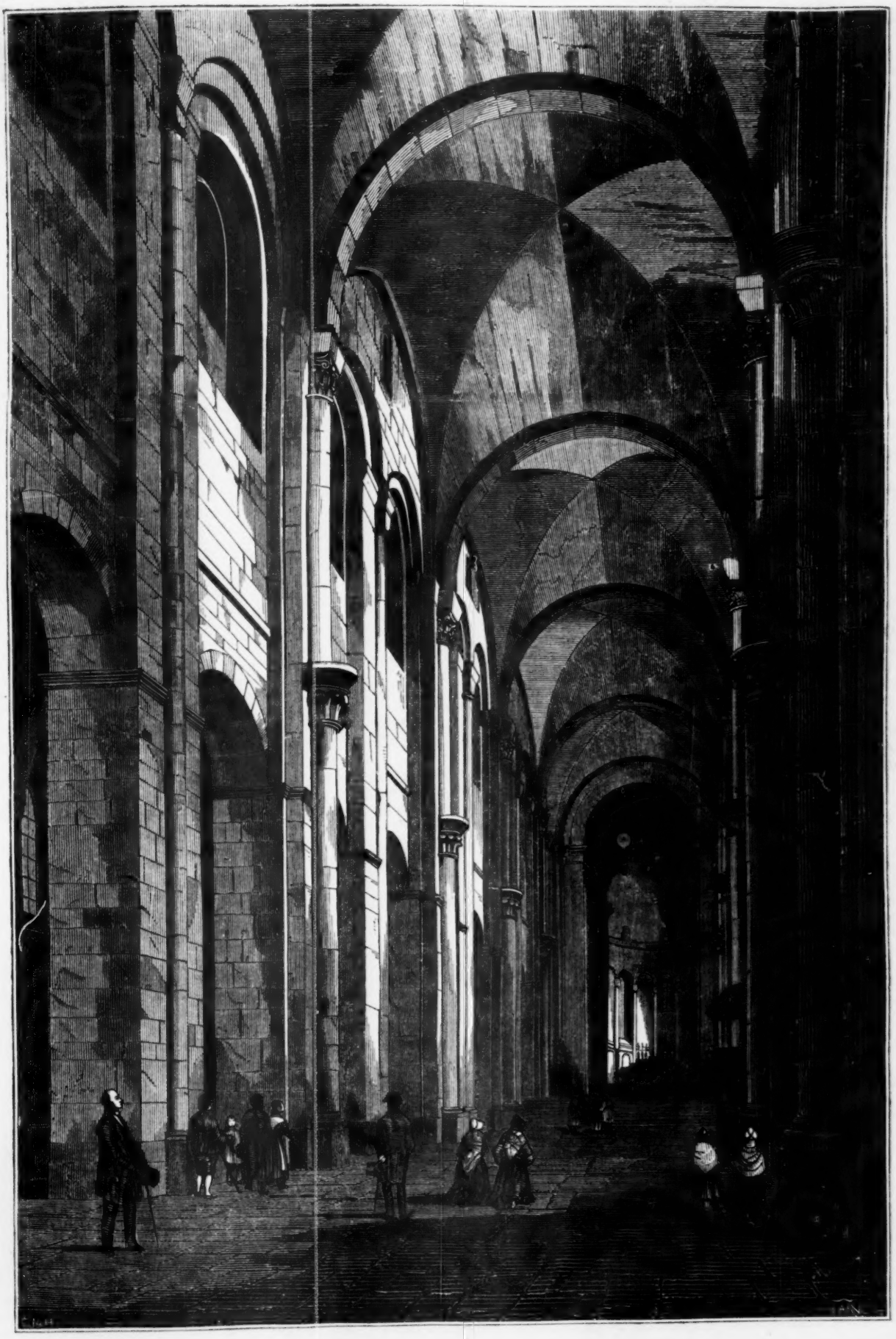
HIS Royal Highness recently sent a donation of 20*l.* to the Slough Mechanics' Institute in a letter, by Col. Phipps, addressed to Mr. Labouchere, who had presided at the anniversary dinner, and who now appears to take an interest in the success of the institute. In this letter a characteristic instance of the good sense and discrimination with which such donations are either given or withheld is incidentally given. "A short time since," says Col. Phipps, "an application was made to his Royal Highness for a subscription towards the funds of this institution; but, as the principal grounds on which that application was based were its former mismanagement, and its failure to carry out successfully any of its original objects, his Royal Highness did not consider that an increase of funds would be sufficient to insure an improved and more successful management in future. Your presidency at the meeting, however—the interest which you have expressed in it, and the tone of the speeches generally upon that occasion—do, in his Royal Highness's opinion, give the guarantee which was alone necessary to enable H. R. H. to gratify his inclination of assisting an institution capable of doing so much good in the immediate neighbourhood of the residence of her Majesty and himself."——The Prince has been elected an honorary member of the Berlin Building Society, of which the Prince of Prussia is the patron. In a letter acknowledging the honour and thanking the society, Prince Albert says "I shall consider myself fortunate in being named a member of a society that has been so successfully active on a field that on this side the channel has also been cultivated with much activity, for the advantage of the working classes, and for which I have for several years felt a special sympathy. If I can be of any use to your Royal Highness by communicating the results of the experience here made for the benefit of your society I shall be most ready to do so, as well as to send specimens of building materials, or anything of the same kind that may be of service to the society." It would be interesting to know something about the principles and rules on which this Prussian Building Society is conducted. We hope it steers clear of the defects and evils of many of those, in this country, the operations of which have rather checked than promoted the benefits which such societies are highly capable of conferring on the working classes. The Prince Consort's special interest in all matters connected with building and constructive science generally was long since manifested in his spontaneous adoption of our Journal, which is regularly sent him at his special request. To this circumstance we can, we trust, without impropriety, advert on such an occasion as the present, although we have felt a delicacy in making a parade of the Prince's name from interested motives, as many in such circumstances might have conceived themselves authorised to do.

IRON FOR FIRE-PROOF CONSTRUCTION.

I ALWAYS feel thankful when THE BUILDER adverts to safety from fire in the construction of dwelling-houses: we hear people deploring the frequent occurrence of conflagrations, causing loss of life and property, but they do not seem to reflect that each room in every house is a wooden box, so that, in reality, the wonder is that there should be so few such disasters. When a house has been thus destroyed, the new one is again raised on the same wooden plan.

Let the brains be puzzled to eternity, no scheme will be devised to render buildings thoroughly safe, except excluding combustible materials from their formation; that is, metal must be substituted for wood, and that metal must be iron. Let a handsome prize be offered, open to all the world, for the best essay "*On the most advantageous mode of applying iron to render edifices completely fire-proof.*" In the present depressed state of the trade, it would not be ill-timed if the iron-masters of the kingdom were to subscribe for such an object, thus combining attention to their own interests with benevolence towards their species. And a novel benefit would result from such a mode of building, namely, the equable heating of each apartment. Many a stately pile has been converted into cinders by the unskilful direction of flues, or by overheating them; but in a fire-proof house they may be entrusted with impunity to the superintendence of the most dull. Were such buildings once to become the fashion, the world would be astonished how it could have remained so long in the wood. W.

METROPOLITAN.—In the report of the Commissioners of Woods and Forests lately issued, an account is given of the following sums expended:—On public buildings and palaces, 98,711*l.* 16s.; Ordnance Office, Pall Mall, 7,000*l.* 2s. 2d.; Buckingham Palace improvements, 5,175*l.* 19s. 7d.; ditto, the inclosure, &c., 5,649*l.* 18s. 6d.; new Houses of Parliament, 113,825*l.* 2s. 6d.; British Museum buildings, 25,096*l.* 14s. 7d.; Nelson monument, 1,326*l.* 1s. 10d.; metropolitan improvements, 22,626*l.* 16s. 2d.; ditto the new street from the docks to Shoreditch, 56,432*l.*; Battersea Park, 22,505*l.* 14s. 7d.; Menai and Conway Bridges, 2,810*l.* 18s. 3d.; Windsor town improvements, 21,781*l.* 9s. 9d.; and New Forest drainage, 1,118*l.* 2s. 2d.——The scaffolding for the commencement of the new ball-room at Buckingham Palace began the other day to show itself above the high hoarding surrounding the works.——The extensive new buildings at Guy's Hospital are progressing towards completion, covering an immense piece of ground at the rear of the old building. ——The building which held the late Chinese Exhibition at Albert Gate, Knightsbridge, has been cleared away. It is said, if Knightsbridge barracks be removed, the whole row of irregular houses here will follow, and a line of mansions, with park frontages, will immediately be commenced.

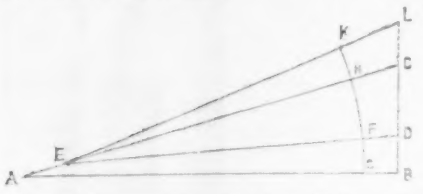


INTERIOR OF SPIRE CATHEDRAL.

TO APPORTION HEIGHTS SEEN FROM A DISTANCE.

THE trigonometrical solution of "Ignoramus's" problem, given in THE BUILDER for December 13, by "E. W." was correctly worked out; but the data upon which it was founded (and therefore the result also) were not very exact. Perhaps, however, a greater degree of accuracy would hardly repay, in most instances, the trouble occasioned by rendering one of the known quantities fractional.

But it will be at once acknowledged that "E. W.'s" diagram is not the best that can be used, when the result is to be obtained by geometrical drawing. Allow me, therefore, to offer to your numerous readers a more accurate mode of proceeding.



Let A B represent the ground line; B C the height of the building; B D that part of it to which the proposed object is to appear equal in height; E the eye of the spectator at any given distance, and at an average height of (suppose) 5½ feet from the ground. Join E B, E D, E C; with centre E and distance E F describe the arc K H F G; measure on the arc a distance H K equal to F G; through E and K draw right line E K L. Then the angles D E B and C E L, at the centre and on equal arcs, are equal; and the perpendicular height C L is the height required.

Perhaps it is as well to add that when the spectator's distance from the building is 300 feet or more, the error occasioned by using "E. W.'s" diagram is very small; but the error would be quite appreciable in some of those numerous instances where the spectator cannot get a full view of the façade at any greater distance than the opposite side of the street.

Humble-minded "Ignoramus" must also remember that his spectator will after all think the object just the right height only so long as he stands at the exact given distance. When he approaches nearer, it will appear too short; when he recedes it will seem too tall.

W. D. PRITCHETT.

CAMPANOLOGY.

THE BELLS OF LONDON.

ALTHOUGH bells are not an intrinsic part of church architecture, yet, as connected with time-honoured or magnificent modern buildings, they have an interest, if not significancy. The following list of sixty-seven peals in London and vicinity is compiled from about twenty years' observation and local inquiry, and includes the most recent additions.

Peals of Twelve.

	Tenor—Cwt.
St. Saviour, Southwark (1)	52
St. Michael, Cornhill (2)	41
St. Giles, Cripplegate (chimes) ..	38
St. Leonard, Shoreditch (chimes) ..	32
St. Martin-in-the-Fields (3)	31
St. Bride, Fleet-street	28

Peals of Ten.

St. Mary-le-Bow (4)	53¾
St. Dunstan, Stepney	32
St. Sepulchre, Snow-hill (5)	32
Kingston, Surrey	30
St. Margaret, Westminster (6) ..	25
St. Alphage, Greenwich (7)	25
Camberwell New Church	25
St. James, Bermondsey	25
St. Magnus, London-bridge	24
St. Clement Dane (chimes) (8) ..	24
Chelsea New Church	23
All Saints, Fulham	21
All Saints, Poplar	21
St. Dionis, Fenchurch-street (chimes)	20
St. John, Horselydown	20
St. Barnabas, Pimlico	20
Streatham Old Church	unknown

Peals of Eight.

St. Lawrence, Jewry	36
St. George-in-the-East (9)	32
Christchurch, Spitalfields	32
St. Andrew, Holborn	28
St. Botolph, Aldgate	28
Hackney Old Church	25
St. Stephen, Westminster (Miss B. Coutts's)	25
St. Botolph, Bishopsgate	22½
St. James, Clerkenwell	22
St. Nicholas, Deptford	22
St. Mary, Whitechapel	21
St. Dunstan-in-the-East	20
St. Mary, Lambeth	20
Kensington Old Church	20
Trinity Church, Newington	20
South Hackney Church	20
St. Mary, Islington	19½
St. John, Waterloo-road	19¼
All Hallows, Barking	19½
St. George, Borough	19
St. Dunstan-in-the-West	19
St. Mary, Rotherhithe	18
St. Mary, Battersea	17
St. Mary, Putney	16½
St. Giles-in-the-Fields	16
Isleworth Church	16
St. Peter, Walworth	15
St. Paul, Shadwell	14
St. Stephen, Coleman-street	14
Christchurch, Surrey	14
St. Matthew, Bethnal-green	12
Woolwich, Richmond, Wandsworth } Old Churches	.. unknown

Six—et infra.

Westminster Abbey	36
St. Vedast, Foster-lane	21
St. Catherine Cree	19
Bow, Middlesex	12
St. Andrew, Undershaft (10) } St. Olave, Hart-street .. } All Hallows, Mark-lane .. }	unknown
St. Bartholomew the Great, 4 (11) } ,, ,, Less, 3 .. }	about 9 each.

A few sets of three; not rung.

(1.) The heaviest peal in England, except Exeter Cathedral, 10—tenor, 75 cwt. About nine of the bells here are at least five centuries old.

(2.) There *was* a peal of 12, tenor, 48 cwt., with chimes, at Spitalfield's church, destroyed by fire. There were then said to be only 12 peals of 12 in the kingdom, one (Gresford) in Wales.

(3.) The weekly "leg of mutton and trimmings," left by Nell Gwynne, the kind-hearted, though erring and frail, and afterwards penitent, mistress of Charles II., who originated Chelsea Hospital.

(4.) Probably only *six* when they encouraged Dick Whittington.

"Turn a-gain Whit-ting-ton,
Thrice May-or of Lon-don."

(5.) Eleven; but one not rung with the rest.

(6.) The sound deadened by the overhanging abbey.

(7.) Two added lately.

(8.) Ditto.

(9.) This church, Stepney, and Shoreditch, same key and weight of tenor.

(10.) Very poor toned; but the handsomest church which survived the "fire." St. Catherine Cree, farther in same street, built in the reign of Charles I., mixed Gothic and Italian, curious. Both little known.

(11.) Oldest church in London; but little known as such. J. D. P.

MONUMENT TO CHARLES XII. OF SWEDEN.—The *Athenæum* says,—"When Charles the Twelfth, King of Sweden, was killed by a ball directed against him from the fortress of Friedrichstadt, to which he had laid siege, a simple column of marble, bearing no other inscription than the monarch's name and the date of his death, was raised to mark the spot. This column having gradually given way before the piece-meal depredations of relic-loving tourists until not a fragment is left,—the Norwegian Government has determined that a worthier monument shall occupy its place; and having submitted the matter to public subscription, three-fourths of the sum needed was offered in less than two days. The work is to be the subject of competition."

"CHEAP" FOUNDATIONS FOR BRIDGES.

IN your paper of the 20th ult. there are, in an article headed "Westminster-bridge," some sentences calling upon you to exercise your influence in deterring the public from countenancing so-called cheap foundations such as are now being put in at Rochester and elsewhere. The writer, who signs himself "A Builder," instances the failures of the foundations of Westminster and Blackfriars bridges, as affording lessons against their use. The reason of the failure of the foundations of the two last-named bridges is, that being upon caissons, without piles, the scour of the river bed has undermined them, which the piles would have prevented. The foundations for Rochester-bridge consist of cast-iron cylinders, 7 feet diameter, sunk deep below the bed of the river, filled with brick-work in cement: these brick piers, protected by thin iron casing, rest upon the chalk, and are of such an area as to present at least a square foot of surface to every four tons weight of the superstructure. No kind of foundation can be more certainly relied upon, their depth below the bed of the river precluding the possibility of their being affected injuriously by any alteration in it. They certainly are *cheap* foundations, for no cofferdam is required to get them in,—each cylinder being one, a *permanent* one, and all who have had any experience in ordinary dam work will know that they are always expensive, often uncertain in their purpose, and, in the case of Rochester, would have been *impossible*.

"Ærumnabilis experientia me docuit."

C.

PARKS FOR THE PEOPLE.

THE forest of Hainault, in Essex, on the borders of London, is about to be alienated from the Crown. Before this is done, I would propose that three or four hundred acres should be reserved, to form a public park.

The close neighbourhood of this disposable remnant of the *folcland* of our Saxon forefathers makes it very desirable that a portion of it, as a breathing-place of pure air, should be dedicated to the community. How much such places for healthy recreation are needed, it is superfluous to tell.

In the proposed park, there might be, hereafter, raised another *ferrovitreous* temple—of statuary, for example, wherein the history of our country might be read in marble and bronze,—where the memories of illustrious men of our land might be gratefully preserved.

And this brings to my recollection that our great Alfred—the poet, patriot, warrior, and minstrel king, the liberator and reformer of his country—deserves the first place. Let the *folcland* park be named, after him, "King Alfred Park"—a fit acknowledgment of the nation's sense of their obligations to the king who declared in his will that he "left his subjects free as their thoughts."

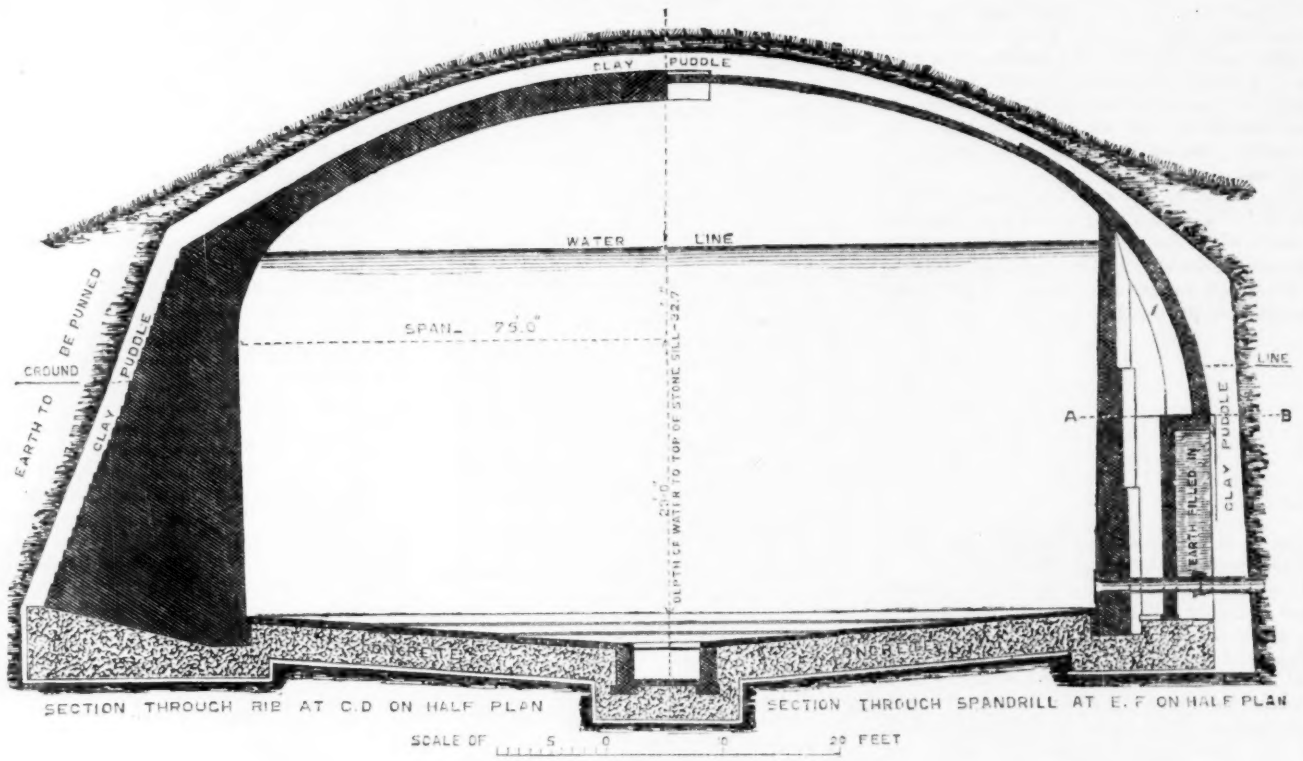
The year 1852 will probably see the people in possession of rights of citizens such as they had in Alfred's time, without a class of *thralls*, to make universal freedom a mere name. The same year should be chosen for an act of grace on the part of the gracious successor of Alfred, who so worthily occupies the throne of Britain, and "in whose veins the blood of Alfred flows." OPIFEX.

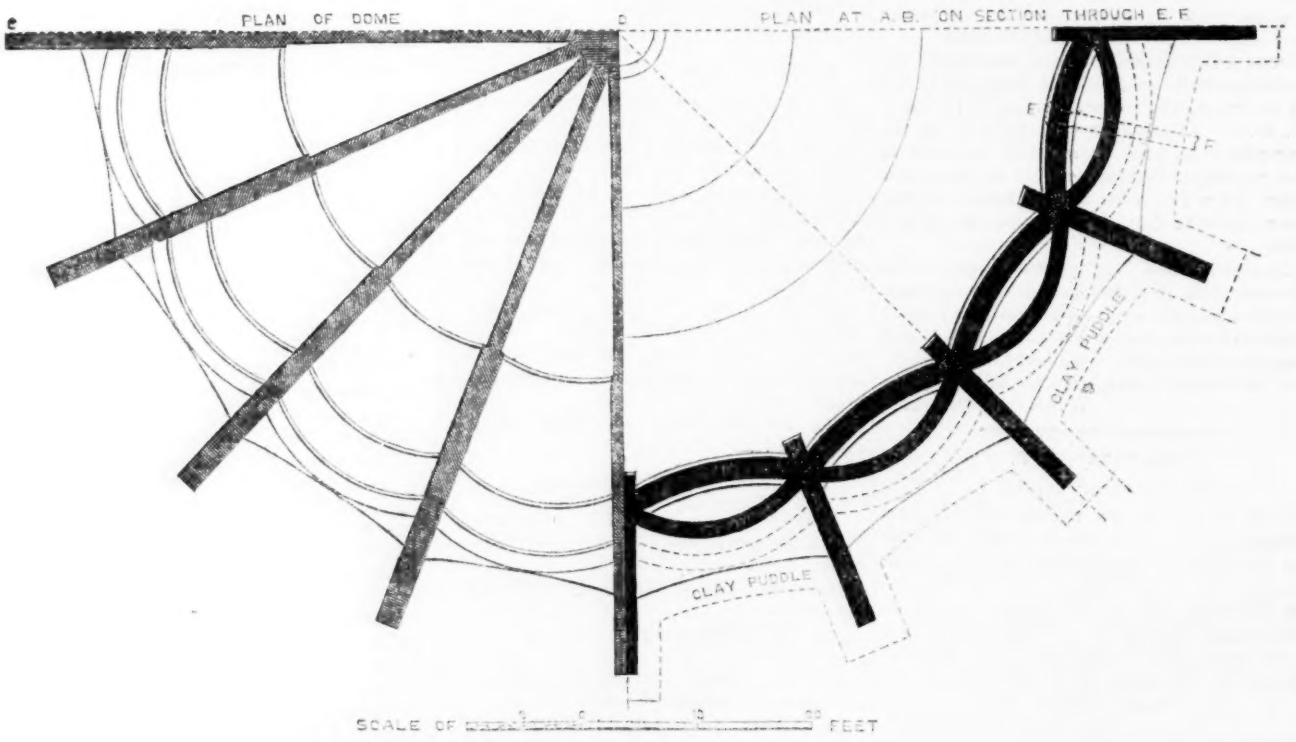
DAMP HOUSES.—We understand that amongst the MSS. left by Professor Anderson, and in the custody of the curator of the Andersonian University of Glasgow, is a paper treating "Of the Moisture in Houses that are situated on Prominent Rocks." Perhaps some Glasgow correspondent would take an opportunity of examining its contents, and forward a brief of them *pro bono*.

IRONSTONE IN NORTHAMPTONSHIRE.—Abundance of iron ore, according to the local *Herald*, has been found in the county of Northampton, bearing 35 to 50 per cent. of iron, while stone with 20 per cent. of the ore is worth carriage. Preparations are in progress for its purchase, and either its transfer to the coal districts, or of coal to the spot, by rail.

RESERVOIR, CROYDON WATER WORKS.

MR. RANGER, ENGINEER.





RESERVOIR, CROYDON WATERWORKS.

THE works for the supply of water to Croydon are the first that have been constructed under the Public Health Act. We have already alluded to them (page 795, vol. ix.), and now give a plan and section of the Reservoir just outside the town, which is not intended for storing, but simply to adjust the supply. This reservoir was constructed under the direction of Mr. Ranger: Mr. Harris was the builder. Our plan shows on one side the retaining walls, on the other the vault with which it is covered. The section is made to correspond. The inner segmental walls forming the sides are in cement, the outer in mortar. The whole is covered with earth, taking the shape of a large barrow; and there is a doorway on one side, above the water line. The diameter is 75 feet; the height to the springing 23 feet, and the rise of the arch 20 feet. The depth of water is 32 feet.

We are glad to find that the members of the local Board of Health here work very well together.

ON A MEANS OF PRESERVING FOR AN INDEFINITE PERIOD BUILDINGS CONSTRUCTED OF LIMESTONES.

The following paper was read at the Paris Academy of Sciences by M. Rochas:—On examining the chemical composition of various kinds of limestone, of which the greater number of our public edifices are constructed, it will be seen that the limestones which have best withstood the ravages of atmospheric influences, are those which contain the largest proportion of silica in combination; whilst those which are devoid of silica, or possess that substance simply in a state of mixture with the other ingredients of the limestone, have undergone a very considerable deterioration.

Observing these facts, I have endeavoured, and I believe successfully, to discover a method of remedying the evil which I have pointed out. It is to place the materials, which are susceptible of deterioration by the action of the air, in contact with silica, under such circumstances, that this latter substance may be made to combine with the base of the limestones, and thus transform them into a very hard, compact, and, to a certain extent, unalterable building material. In pursuing this investigation, I have made a considerable number of experiments, taking as a starting point the previous labours of M. Kulmann.

I have the honour of submitting to the notice of the Academy three specimens of limestone which have undergone the process of silicatization. For these I am indebted to the kindness of M. Violet le Duc, who carefully selected them for the purpose, from amongst some old materials taken from those

parts of the Church of Notre Dame which had undergone the greatest change. Part of each of these specimens I have allowed to remain in an unprepared state, in order that a comparison may be made between it and the part which has been silicatized.

Before closing this communication, I may perhaps be permitted to call the attention of the Academy to the monuments recently discovered by M. Mariette, in the excavations made by him in the Temple of Serapis, at Memphis. In the early part of this year, during my travels in the East, I had the opportunity of examining the statues, sphinxes, &c., which had then been discovered. These monuments of antiquity are for the most part formed of soft limestone, possessing but very little cohesive power. I found that, after having remained buried during so many ages, the limestone had, so to speak, entirely lost its solidity, that indeed in a very short time after their exhumation, the limestone became detached in scales, and the statues so deteriorated, that it was deemed indispensable to cover them again with sand, in order to preserve them.

M. Mariette having informed me of his great anxiety to transport these statues in good condition to Paris, I recommended him to adopt the process of silicatization, in order to give that degree of solidity to the statues necessary for their transport to Europe: at the same time I offered to undertake the charge of the operation.

This communication of M. Rochas was referred to a committee, consisting of MM. Cordier, Elie de Beaumont, and Dufrenoy.

SIGHTS AND SCENERY.

Drury-lane Theatre.—The leading feature of the pantomime here ("Harlequin Hogarth") is the struggle of Idleness and Ignorance with Industry and Knowledge, and it serves to introduce the usual amount of pantomimic acting, tricks, and changes. One of the best scenes, though hard, is the second—a change from the haunt of Idleness to the abode of Industry, wherein are shown bridges, aqueducts, and buildings. The distance in the first scene is nicely painted, and so is a series of transparencies representing Hogarth's pictures of the Idle and Industrious Apprentices. The triumph of Industry is achieved in the transept of the Crystal Palace. The artists here are Messrs. Jones and Cuthbert. In "Macbeth," by the way, which has been revived for Miss Glyn, the most hopeful tragic actress of the day, an anachronism is committed in the shape of a sixteenth century gateway in one of the scenes.

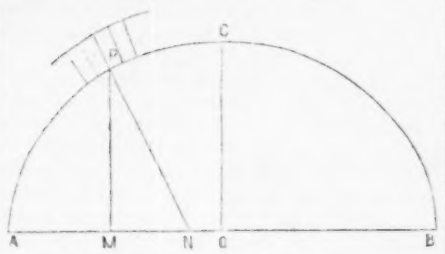
The Princess's Theatre.—At this theatre, which is now under the sole management of Mr. C. Kean, the pantomime, "Harlequin, Billy Taylor," is made to depend rather on the persons engaged in it than the scenery, although there are two or three clever effects, especially the introduction of the conventional fairies (whither have they all flown now-a-days?) in nautilus shells, and a "Bird's-eye view of London by moonlight." The latter shows to great advantage the *cowls and gutters* of our disfigured metropolis, and must have given some trouble to the carpenters. Stage carpenters, by the way, are a distinct race of mechanics. As Dickens says,—"Some of them growl bits of Italian operas, or melodramatic music, as they work. They are full of traditional lore of the 'Lane' and the 'Garden' in days of yore. Probably their fathers and grandfathers were theatrical before them; for it is rare to find a carpenter of ordinary life at stage work, or *vice versâ*. Malignant members of the ordinary trade whisper even that their work never lasts, and is only fit for the ideal carpentry of a theatre. There is a legend, also, that a stage carpenter being employed once to make a coffin, constructed it after the 'Hamlet' manner, and ornamented it with scroll-work. They preserve admirable discipline, and obey the master carpenter implicitly; but, work once over, and out of the theatre, he is no more than one of themselves, and takes beer with Tom or Bill, and the chair at their committee and sick club *réunions*, in a perfectly republican and fraternal manner. These men labour from six in the morning until six in the evening; and, probably, as 'Fee foo Fum' is a 'heavy pantomime,' from seven until the close of the performances." The "Iron Chest" has been revived here, and affords the manager one of his best personations.

The Adelphi Theatre.—We have seldom been able to offer higher praise to the scenic artists engaged at the Adelphi (Messrs. Pitt and Turner) than we can do for their works in "Little Red Riding Hood,"—a sparkling and clever extravaganza by Mr. Tom Taylor, in which Mr. Honey, Miss Fitzwilliam, and others play very cleverly. The scene is laid on the banks of the Rhine, and several parts of the green river are charmingly portrayed. The architecture, too, is drawn with great precision (a vaulted chamber, for example), and the whole is highly creditable to them. The piece is altogether one of the best of its class.

TO DRAW THE JOINTS OF THE VOUSSOIRS TO AN ELLIPTIC ARCH.

IN large elliptic arches it is important that the several voussoirs should be accurately jointed together, and the following method will be found to be simple and easy of application.

What is required to be done is to draw the normals at any points on the ellipse.



Let OA and OC be the major and minor axes of the ellipse, O being its centre. It is required to draw a normal at any point P on the ellipse.

Draw PM perpendicular to OA, and let N be the point where normal at P meets OA.

Now, it is shown in Treatises on Conic Sections that $MN = \left(\frac{OC}{OA}\right)^2 \times OM$ and OC and OA are given with the ellipse, so that this equation gives the point N corresponding to any point P on the ellipse; and if we draw the line PN, and produce it above the curve, we have any one of the joints of the voussoirs.

E. W.

NOTES IN THE PROVINCES.

Stourbridge.—We are informed that a design for the Stourbridge School of Design, by Mr. Mr. Thomas Smith, of Stourbridge, architect, had been adopted by the committee on the Government inspector's recommendation; that builders were solicited to send in tenders, and that the tender of Mr. Edward Smith, of Oldswinford, was accepted. The works were to have been in a forward state by Christmas, but some irregularity in the title of the intended site seems to have determined the committee to abandon the new building altogether and to fall back upon a scheme to purchase and fit up the old theatre for the purpose. This building is central for the town, but objections are made to the position as one for a public school.

Stratford-on-Avon.—The chancel floor of the Guild Chapel has recently been newly paved with Minton's encaustic tiles. The Rev. T. Medwin has given orders to Messrs. T. and E. Kemp to fill the east window, from designs which they have furnished, in stained glass, representing the sacraments of Baptism and the Lord's Supper, the Crucifixion, the Resurrection, and the Ascension. This chapel was originally built in 1296; and was rebuilt by Sir Hugh Clopton, in the reign of Henry the Seventh.

Llandaff.—In a communication to the public, signed W. D. Conybeare, in a local journal, occurs the following passage relative to the restorations at Llandaff Cathedral:—"I may say that I (as it were) inherited about 700*l.* from my predecessor; and I have myself collected 3,000*l.*; so that I am responsible for about 3,700*l.* altogether. The first work which devolved on my care was the restoration of the *presbytery*, or the two eastern bays of the choir. This has been now completed, at an expenditure of about 2,800*l.* The works were all executed by contracts, through public tender. The architectural effect produced I submit to the taste of all competent observers; remarking only that the ancient features of the building have been strictly *restored*, with no wanton innovation. The balance remaining at our bankers is rather more than 1,100*l.* The next work which requires immediate attention, and which is essential, in order to supply adequate room for public worship, consists in raising a new roof, and constructing a new clerestory, over four arches. The expense of this is estimated by our architect (who has also consulted the judgment of the late contractor for the presbytery) as falling within 2,500*l.* Our present bishop has munificently promised for the accomplishment of this end the sum of 400*l.*, within the two ensuing years. I have also, from other quarters, 150*l.* pledged to me, so that I need only raise about 900*l.* more from the public generally. We may then proceed boldly to the completion of this most desirable work. The fitting up of the choir and all other needful interior decorations may confidently be referred to the general fabric fund of the Chapter, which is sufficient for that purpose."

Birmingham.—A fountain has been put up in the centre of the Market-hall. The basin is of Yorkshire sandstone, and is 15 feet in diameter, and will hold 1,000 gallons of water. From this rises a double plinth of sandstone, supporting a pedestal of magnesian limestone, on which is placed the metalwork of the fountain. This consists of a fluted metal shaft, surmounted by a Greek tazza, and surrounded by four figures of children emblematic of four of the principal branches of industry carried on in Birmingham. An antique vase, out of which the jet proceeds, forms the apex of the column, the water falling into the tazza being discharged into the basin below through eight apertures in so many lions' heads. Suspended from rings attached to the panels of the pedestal, and resting upon the consoles, are four groups in bronze, representing the various commodities sold in the market. The design and workmanship are by Messrs. Messenger. They contracted to furnish the metalwork for 400*l.*, but it is said to have cost them 900*l.*; and Mr. Chaplin, who contracted for the stonework, finds, it seems, that he has also considerably exceeded his estimate. We hope to find, when we see it, that it is something better than the generality of our public fountains.

Hulme.—It is proposed to erect a new church in Boston-street, Moss-lane, Hulme, towards which donations have been received, amounting to 2,200*l.* A circular, soliciting subscriptions, concludes with the expression of a hope that the subscriptions received will be sufficient for the erection of schools as well as a church: the estimated cost of both is 6,000*l.*

Preston.—The scheme for a covered market, at a cost of 25,000*l.* or, including approaches by new streets, &c., 40,000*l.* has been rejected for the present by a majority in the council of 18 to 17, on account chiefly, it appears, of objections to the proposed site as too destructive of property, and hence too expensive. The mover of the amendment, however, appears to be an advocate for a covered market, but amused the council with his ideas of the *value* of *mere* designs. On this point, as reported by the *Preston Guardian*, Mr. G. Smith, the mover of the amendment, said—"This project required their long consideration and the cultivation of their minds. (A laugh.) He would suggest to the committee that they should advertise and offer a premium to three competitors for the best site, and for the most economical mode of erecting a covered market. For the best site and the least expensive plan he would give 50*l.* (Laughter.) Then for the second best he would give 25*l.* (Continued laughter.) For the third he would give 12 guineas. (Increased laughter.) Now the whole matter of the question came plainly before them: they

would give an amount of something like 80*l.* and he did not hesitate to say it would save them 10,000*l.* (Loud laughter.)" We suspect that some at least of the Preston council do require to get up a little "cultivation of their minds" previous to the issue of the proposed advertisement.

Doncaster.—A meeting of ratepayers and other inhabitants has been held, at which it has been resolved, as the opinion of the meeting, that the existing water power, if applied in the most efficient manner, would be amply sufficient for the supply of the town according to the requirements of the Health of Towns Act, and at the same time the most economical mode of effecting that object. A memorial to the Board on the subject was unanimously agreed to.

Leeds.—Messrs. Peter Fairbairn and Co., the machine makers, have purchased for the use of their workmen, as a means of affording them agreeable recreation, a stock of Saxe horns and other instruments, which will form one of the largest and most effective brass bands in that part of the country. The instruments are of the same description as those used by the Distin family. Mr. Whitley, leader of the Bramley band and of the Leeds troop of Yorkshire Hussars, is appointed teacher of the new band.

Gateshead.—The project of a market for Gateshead is likely to be again brought under consideration. "The Island," in the main thoroughfare, is recommended by the *Observer* as the best site for such a work.

Gatehouse.—A Dumfries paper states that a vein of copper ore, 18 feet wide, was lately found at Laggan, in the parish of Anwoth, near Gatehouse, by a labourer, while pulling heather. The whole district, it is said, teems with metal.

Dunkeld.—"A contract," says the *Perth Courier*, "was some time ago entered into with the patentee of the new discovery of 'water gas' for lighting the streets, shops, and dwelling-houses of Dunkeld. The necessary preparations have now been completed, and a preliminary trial made in presence of the patentee, Dr. Miller of Manchester, and other gentlemen interested in the gas manufacture. There is neither smell nor smoke emitted from the gas, nor during the manufacture. The comparative cheapness is also an important element in the question; and the more so, in a town of limited extent and trade such as this." Under Dr. Miller's patent, hydrogen, as we think has been already explained to our readers, is first extracted in a retort from water and then loaded with carbon in another retort. The hydro-carbons are a curious and interesting class of bodies. They not only comprise the various qualities of illuminative gas, olifeant, &c., but, in proportion as the hydrogen which *wings* them becomes more and more loaded with the carbon, they sink into fluids more and more dense, from subtle ether and alcohol, through the naphthas and turpentines, and at length pass into the solid naphthalines, with their beautiful white crystaline laminæ, smelling like the flower narcissus, and susceptible of iridescence, also into paraffine, and ultimately Cannel and other coals, which, in fact, are still hydro-carbons. Now the idea of first preparing the volatilizing hydrogen and then loading it with carbon, till a sufficiency be converted into gas that will burn brilliantly, as ordinary gas does, to a certain extent at least, in proportion to the amount of carbon with which it is loaded, is certainly ingenious; but still more so, as well as probably far more practicable and economical, is that which it farther suggests of first merely driving out of common coal a hydrocarbonic gas of low illuminative power, and then enriching it by the aid of Cannel coal, the richest of coals in hydro-carbonaceous properties. An approximation to this idea was made by Mr. White, in his alleged preparation of hydrogen from water into hydro-carbonaceous gas by the aid of resinous substances, which are just a sort of solid though partially-oxydized turpentines; but it seems to have been left to our correspondent, "C. C.," to mature the idea of assimilating the highly carbonized hydrocarbon of Cannel coal with highly hydrogenized hydro-carbonaceous gas, or gas of low illuminative power, as at first prepared, and so, easily and readily, to form a brilliant illuminative gas, rich in carbon. Perhaps the only hope of additional advantage, economy, and convenience, in this species of experiment, consists in the possibility that even common coal so treated, by passing meagre gas over it while it is in a heated state in a separate retort, may enrich the gas, so treated, as much as Cannel coal does, if not even more so, though it may not increase it so much in quantity as the Cannel is capable of doing. We have frequently predicted vast improvements in the distillation of coal gas, and are likely, it would appear, to see the prediction very soon fulfilled.

HOW THE WORK WAS DONE ON THE BIRMINGHAM AND OXFORD EXTENSION.

AT a recent meeting of the Institute of Engineers, an account was given of the works on the Birmingham Extension of the Birmingham and Oxford Junction Railway, by Mr. C. B. Lane. The reader said the line was intended to form the connecting-link between the Birmingham and Oxford, and the Birmingham, Wolverhampton, and Dudley, and so complete the broad gauge circuit with Bristol and the south-west of England. The line commenced near the Coventry-road, and was to have terminated at Great Charles-street. From Adderley-street to Park-street, both inclusive, the town was crossed by a viaduct; and from Moor-street to Monmouth-street, the line passed under the highest of the eminences on which Birmingham stands, by means of a tunnel, which was to have been constructed as a covered way—that is, by opening the ground, putting in the brickwork, and again covering up; and the part of it as yet completed, from Moor-street to High-street, being about 142 yards in length, was executed in this manner. It was 27 feet in width at the level of the rails, and was built entirely of Staffordshire brick set in mortar, with the exception of the arch lengths through Carr's-lane, which were set in cement. The average rate of progress in the tunnel was 8·1 lineal yards per week.

The viaduct consisted of fifty-seven openings, composed of nine segments, each 30 feet span and 6 feet rise; fifteen semi-circles, also 30 feet span and 15 feet rise; twenty-seven semi-ellipses, each 15 feet rise, and varying in span from 37 feet to 48 feet, and six street bridges, mostly skew, and varying in form, span, and rise. Its total length was 930 yards; general width, from face to face, 31 feet 7½ inches; and between the parapets at the level of the rails, 29 feet. It was built entirely of brickwork set in mortar, with the exception of the soffit of the bridge over Park-street, which was constructed of cast-iron girders, with a cross-transomed memel flooring. The red brick of the district was used throughout the footings, the internal work of the piers, and the spandril walls: the arches and parapets were constructed of Staffordshire brick, from the "common stock"—the copings, mouldings, and dentals being made of Staffordshire brick clay; and the whole of the work was faced with Staffordshire "best blue." All the brickwork was set in moist mortar, so as to press to a thin joint; and in hot weather the bricks were kept constantly wet. The mortar used in the work was composed of the red sand of the locality, and Dudley or Greaves' blue lias lime, the latter being used in all foundations, arches, and face-work, mixed in the proportions of one part of slaked lime to two parts of sand, and worked by a steam-mill driven by a four-horse power steam-engine, made by Mr. Nathan Gough, of Manchester. This mill was capable of supplying fifty bricklayers per day with a mortar of a perfectly even texture, entirely free from lumps, and therefore less likely to become vesicular, from the transfiltration of water, than that mixed by the common pug-mill. Each set of centres consisted of five ribs, each rib being supported on two vertical, and two sloping props, the former under the heels of the ribs, and the latter under the points, where the struts of the ribs terminated in an iron shoe. The laggings used were 3-inch deals, carefully dressed by the adze to the proper curves, and lined for the courses of the skew arches. Corbels of heading bricks were carried out from the backs of the arches in the range of the spandril walls, of equal width with them, and connected by brick beams from arch to arch, for stiffening and equalising the pressure from end to end of the viaduct; and the useful effect of this mode of construction was proved by the comparatively small amount of the settlements of the arches.

The various modes adopted, and mechanical contrivances used, for raising the materials to a considerable height, were described; and deductions were drawn from a very numerous series of experiments, to ascertain the values for the useful effect produced by the "labouring force" (Whewell), or "Travail Mécanique" (Poncelet), of a man under different modes of its application, and also for a horse under alternating motion over a short space. From these it appeared, that the relative costs of raising the materials to a height of 46 feet, by the horse-lift, the swing-lift, and the box-lift, were 3·08, 5·90, and 4·13 pence per ton respectively, shewing a saving in favour of the horse-lift against the swing-lift of nearly 3d. per ton, and against the box-lift of rather above 1d. per ton.

RAILWAY JOTTINGS.

THE aggregate amount of traffic on railways in the United Kingdom, published weekly from 1st January to 20th December, inclusive, amounted to 14,297,705*l.*; corresponding period of 1850, to 12,513,625*l.*; corresponding period of 1849, 10,823,221*l.*; and in 1848, 9,858,770*l.*——The number of parcels passing "in" and "out" of the Euston-square terminus, during the Christmas week, has amounted to nearly 40,000. Out of these 40,000 parcels only two had the addresses lost. One of the trains brought up ten tons of poultry.——A Bill for an Oxford and Brentford line has been deposited, it appears, by the Oxford, Worcester, and Wolverhampton Company. Messrs. Peto and Betts have put their names down, it is said, for 400,000*l.*, Messrs. Tredwells for 200,000*l.*, and the solicitor for 28,400*l.*——Mr. R. Stephenson is reported to have completed the survey of the Cairo railway. His decision is announced to be that the plan suggested by the Pacha for carrying the work through the Delta should be followed out. Instead of the costly bridgework proposed across the two branches of the river, it is probable a pontoon, or floating stage, will be used for carrying the rails. 18,000 labourers, supplied from the respective bordering districts, will be set to work immediately.

RESOURCES OF IRELAND.

ENCOURAGED by railroad and packet-station works, the interests of Ireland generally, and of the county Galway in particular, have recently been much stimulated—property in the borough has acquired an increased value, and resources hitherto neglected are being brought into play: this, together with the prospect of a regular line of packets between New York and the noble harbour of the west, promise a futures most cheering for the province of Connaught, heretofore the poorest portion of the kingdom.

With a communication by rail of five hours to Dublin and Belfast, and a continued line of transit *viâ* Holyhead to Liverpool and London, this route cannot fail to be adopted as the most direct postal medium, as well as for the despatch of light merchandise, since a saving of *three days* will be effected, as contrasted with the voyage round Cape Clear, the Lizard, Foreland, the Downs, and the beating up channel. A submarine telegraph between Howth and Holyhead must limit all governmental correspondence to this line.

It will be a novel feature in statistics, if the emigrant hordes which fled misery and famine in their native land, shall be replaced by industrious English, Welch, and Scotch, who may settle in the derelict soil, where they will

make the wilderness blossom, and the poverty-stricken burgh become a city.

The opportune establishment of the railroad and harbour will effect all this, and moreover the as yet unwrought mines of wealth in fisheries, the richest on our coasts, will be developed, and other products, such as marbles and quarry stone, will send their tributes also, enriching the landed proprietor, the labourers who toil, and benefiting both the trader and consumer throughout the country.

For a few years past an enterprising English firm, the Messrs. Franklin (of Westminster), have been operating on the black marble quarries of Menlo, near Galway; and, still more recently, brothers of the same firm have wrought stone quarries at Kilrush, near the mouth of the Shannon. The properties of these quarries, it is said, make them peculiarly eligible for flag-stones and city pavements. The material is a conglomerate limestone: the formation extends many miles: the rock is easily wrought as it comes to the surface, and is of great depth—laminating freely: it can be split into flags of any required thickness and extent.

The colour is a grey drab, and for strength the stone surpasses the Yorkshire, the expense being no more for light, and less for heavy or thick samples. 30,000 feet are to be used for the Galway terminus.

Black marble being now much used by all London architects, and trottoirs or foot-pavements much extended of late throughout the suburbs, the introduction of these fossils from the sister isle would do much to stimulate industry amongst a long neglected people.

QUONDAM.

SANITARY CONDITION OF LONDON.

THE annual report on this subject by the City Medical Officer of Health, Mr. Simon, has been published, and may be usefully consulted by those interested. Mr. Simon points out the new powers which the corporation have for the prevention of sanitary evils, and urges the necessity of using them efficiently.

"In 1849," he justly remarks, "with the cholera amidst us, great exertions were made, and greater promises. In that dreadful week, when 2,000 victims of our metropolitan population fell beneath its poison; when every household, from hour to hour, trembled at the visible nearness of death; the public was scared out of indifference. If the visitation could have been bought away, at the expense of doubling all local rates in perpetuity, no doubt the sacrifice would have been made. Public opinion was kindled to overwhelm all opposition.

The metropolis was to be drained afresh; the outfall of sewerage was no longer to be beneath our windows; the river was to be embanked; its rising tide was no longer to make our sewers disgorge their poisonous contents into our streets and houses; dead bodies in their decay were no more to desecrate the breathing-space of the living; water was no longer to be supplied—clumsily, insufficiently, and unwholesomely, at the discretion of private capitalists: all was to be amended.

For participation in these advantages, the City had to look beyond its own representatives, and to await the more comprehensive measures of her Majesty's Government.

Two years have elapsed, and none of the measures referred to have made visible progress. The water-question remains unsettled: arrangements for extra-mural interment of the dead have been disconcerted at what seemed the moment of their completion: the river still receives the entire sewage of this immense metropolis, and still at each retreating tide, spreads amid the town, as heretofore, its many miles of fœtid, malarious mud."

ARCHITECTURAL EXHIBITION, PORTLAND GALLERIES.—We are glad to hear that the exhibition is about double the previous collection in extent, and of a much better character. We shall have something to say about it next week.

THE POLYCHROMY OF ANCIENT ART is announced as the subject to be considered at the meeting of the Royal Institute of British Architects on Monday next, when Professor Donaldson will call attention to the system developed in the superb work recently published by M. Hittorff on this matter.

EPITAPHS.—HERTFORD CHURCHYARD.

THE churchwarden of Hertford has favoured us with a letter, denying that the two epitaphs we lately gave are in the churchyard there. He continues,—"The only singular inscriptions adjacent to that beautiful avenue, are as follow: on one stone,

Here Lyeth
Black Tom
of the Bull Inn in
Bishopsgate-street,
1696.

And on the other,—

Here
Lies the Body of Sarah Young,
Wife of James Young,
of West Street.
Died, Sept. 8th, 1749. Aged 66.
She
Was a Pious Christian
And 38 Years so Kind
And Loving A Wife as
Never Gave her Husband
An Angry Word.

There is also another singular inscription (considering the building in which it is placed) on a tablet in the chancel, to the memory of Lord John Townshend, of Balls Park in this parish, who died in 1833.

For a period little short of 30 years
He was the Friend and Companion
of that illustrious Patriot and Statesman,
Mr. Fox,
A distinction
Which was the pride of his life,
and the only one
He was anxious might be recorded
after his death."

Our informant of the first-mentioned epitaphs (whose character puts doubts as to his correctness quite out of the question), says,—"It is upwards of forty-five years since I was in the church-yard there; previous to which I was in the constant habit of attending service at 'All Saints Church,' during which time I had many opportunities of seeing and reading, as I have done, the inscriptions I furnished you with. I cannot take upon myself to say whether the tombstones are there *now*: if not, they must have been removed, or the lettering have become defaced by age, &c.; but I am quite willing to restate that they were there *once*, in the situation wherein I have described them."

A SUGGESTION FOR A LIGHTHOUSE ON THE GODWIN SANDS.

THE proposition of erecting a lighthouse on the Godwin Sands has occupied the attention of engineers and scientific men for a series of years, and we are still as far as ever from its being realised.

I would propose that a number of large blocks of stone of various sizes (similar to those employed in the construction of the Plymouth and Portland breakwaters) should be deposited on any selected spot adjacent to these sands: *not on the sand* ITSELF, but rather upon the border of it, in two or three fathoms water. These stones should be in the form of a circle, not less than 150 yards in diameter at high-water mark, and raised as high above as possible. A quantity of ballast mixed with ground chalk should be thrown in with the stones, to bind the whole together. This heap of stones should be allowed to settle and consolidate for two or three years; and as some of them may get washed away by the lashing of the waves, they should be replaced by others as soon as possible.

The next step will be to remove the top stones in the centre of the pile to the level of low-water mark, and prepare for the foundation of the lighthouse by making it level with concrete. The foundation should be of wrought iron plates, strongly riveted and braced together, circular in form, and 60 feet in diameter, upon which should be fixed a border of cast iron 20 feet high, the space inside to be divided into a series of cells (all of cast iron), and filled with concrete, composed of four parts of coarse ballast, two of sand, and two of Roman cement. (The reason why I choose Roman cement is, because it is less likely to have an injurious effect upon the iron than lime.) Upon this erect the lighthouse, constructed of corrugated galvanized iron plates, strongly braced throughout.

Round the lower part of the lighthouse should be raised another border, about 10 feet inside the first one, and about 10 feet high, filled with concrete the same as the other. This would give great stability to the structure.

J. C. P.

Books.

Suggestions for a Crystal College, or new Palace of Glass, for combining the Intellectual Talent of All Nations; or, a Sketch of a Practical Philosophy of Education. By W. CAVE THOMAS, Master of the North London School for Drawing and Modelling. Dickinson, Brothers, New Bond-street. 1851.

THE title of this pamphlet is not a good one; or rather its sub-title, "A Sketch of a Practical Philosophy of Education," ought to have been the principal one. The "suggestions" alluded to are confined to the last two out of sixty three pages; and moreover "a Crystal College" would be wholly unsuited for such a purpose as that suggested, unstable as it would be, and continually exposed to alternations of temperature. Mr. Thomas appends two diagrams, or figurative outlines of a ground plan of such a college, circular in form and divided by inner circles and radii into sectional lecturing or teaching departments, comprehending in all a vast scheme of individual education. The main subject of the author's treatise may be gathered from the following remarks in the preface:—

"The fundamental character of the scheme we are about to develop may startle those accustomed to consider education in taste as an isolated branch of study, as something which may be attained *per se*, disconnected from other studies. Here they will find, on the contrary, our object to be the vindication of thorough instead of partial measures, to show that a purer knowledge of the beautiful can only result from a more perfect system of education, in which all the faculties are proportionately developed, the Fine Arts having their due share of attention with other exercises; also that this is not merely a question concerning the future excellence of our ornamental wares, but the greater one of the future welfare and progress of the British people."

England, the author conceives, would thus, by the adoption of such a system, taught in an edifice such as he describes, and in which the highest talent, foreign as well as native, in every section of science, should be concentrated, become the centre of the intellectual world, and so attain the culmination of her power.

The essay, and indeed anything that Mr. Cave Thomas may set before the public, is well worthy of perusal; but we doubt the practicability of such a system as yet, and fear that even though it were practicable, the fruits of such a vast scheme of education would not be what its projectors would anticipate. Special faculties and prepossessions in youth would inevitably lead to special attention to particular branches of knowledge, to the neglect of all else, in spite of every endeavour to level all to one universal democratic standard of acquisition and of knowledge; and even though this were not the case, what could the result by possibility be, but that an universal and useless smattering of all sorts of knowledge would be substituted for a well-grounded acquisition of the more essential or the chosen branches? Would it not be like an attempt to set up in commercial life with mere samples of everything sold by all, in place of with a good stock of something or other by which the tradesman would be likely to profit and to live? With man's limited faculties, it is only for the few of universal genius to attempt to compass every branch of science.

Transactions of the Architectural Institute of Scotland. Edinburgh, 1851.

THE first volume of the Transactions of the Architectural Institute of Scotland is a creditable monument of the industry and abilities of the members. It contains thirteen papers, occupying 244 nicely printed pages, and has a

number of illustrations. Some of the essays were published by us at the time. Amongst those not given by us are a long and valuable memoir by Mr. R. Ritchie, "On Ventilation and Warming of Buildings, and Heating of Baths, as practised by the Ancients," and an essay "On the Geometric Principle of Beauty in the Mouldings of Ancient Greek Architecture," by Mr. D. R. Hay.

Proposal for a new Cattle Market for the Supply of London. By W. WILSON, C.E. London, 1851. Waterlow and Sons.

THE site proposed by Mr. Wilson is part of the large tract of land which lies on the north bank of the Thames, to the eastward of the new docks now in the course of formation near the mouth of the River Lea, and on the line of the North Woolwich branch of the Eastern Counties Railway. A large plan for a market accompanies the pamphlet.

The Royal Guide to Wax Flower Modelling By Mrs. PEACHEY, Artiste to her Majesty. Rathbone-place, 1851.

ORDINARY ingenuity and industry will enable any lady, by means of this book, to master a pleasing and not useless accomplishment, and to build up enduring representations to adorn her rooms, of the sweet flowers which had their birth

> "To minister delight to man—
> To beautify the earth,"

and die too soon.

The book is as gay as summer, and the language as flowery as Flora herself could desire to be addressed in. In the next edition the leafy luxuriance should be a little pruned, and the fruit will be easier seen. The instructions are clear, and the illustrations pretty. We happen to love flowers dearly, and we like those who love them too:—

> "Flowers are the brightest things which earth
> On her broad bosom loves to cherish."

And when we cannot obtain those "pencilled by the hand of God," desire nothing better than Mrs. Peachey's "counterfeit presentments."

READING FOR RUNNERS.

The Road. By Nimrod. With Illustrative Woodcuts. Murray, Albemarle-street. 1851.

The Turf. By Nimrod. With Illustrative Woodcuts. Murray, Albemarle-street.

James's Fables of Æsop. One hundred original Woodcuts. Murray, Albemarle-street. 1851.

On the Life and Writings of Addison and "Horace Walpole." By Thomas Babington Macaulay. Longman, Brown, Green, and Longmans. 1852.

Murray's "Reading for the Rail," and Longman's "Traveller's Library," must be paying speculations, since the issues proceed so steadily. And they cannot but be successful, considering their sterling merit. In such an instance as that of "James's Fables of Æsop," with such cuts, it would have been utterly impossible that a book like this could have been got up and issued for half-a-crown, unless a profit had been previously realised for it in a more expensive form. The shilling pamphlet on Addison is reprinted from Mr. Macaulay's "Critical and Historical Essays," and, like those which it here accompanies, needs no special recommendation by us.

GOVERNMENT SCHOOL OF MINES.—On Tuesday last, Mr. A. C. Ramsay delivered the introductory lecture of a course to be given by him at the Museum on Geology. On Wednesday, the 7th, Mr. W. W. Smith gave his introductory lecture on Mining and Mineralogy. Dr. Percy followed on the 8th, on Metallurgy.

THE BRITISH ARCHÆOLOGICAL ASSOCIATION.—Another visit to the city antiquities will be made by this Association on the 14th inst., when Barber's Hall, in Aldersgate, St. James-in-the-Wall, St. Giles's Cripplegate, and Carpenter's Hall will be visited; a paper will be read by Mr. Pettigrew at Barber's Hall; and a dinner discussed at Mason's Hall Tavern, Basinghall-street, in the afternoon.

Miscellanea.

RELICS AT WANDSWORTH.—The course of a recent ramble in Surrey brought me to the pleasant village of Wandsworth, or Wandlesworth, as it used to be called, from the river Wandle on which it is situate,—a stream dear to the hearts of all true "Waltonians," on account of the excellence of the trout to be found in it. On walking up to a small Roman Catholic church built not many years ago, my attention was excited by an erection against the west wall, which at a distance resembled an altar, but upon examination proved to be composed of three fragments of stone, each about 3 feet to 3½ feet long, and 1½ foot deep, which had once formed the basis of three sets of clustered columns of a late period of pointed architecture. Upon inquiry I found that they were dug up when excavating for the inclosure of the church, the minister of which placed them in the position they now occupy. Where did they come from? None of the county histories which I have consulted mention any building formerly existing in or near that place such as these relics can have belonged to; but perhaps one of your correspondents may be able to inform me. There is a tradition that a house in the town was honoured with a visit from the "virgin queen" in one of her royal progresses. Is this building now in existence?

A. W. H.

THE ROYAL SCOTTISH ACADEMY.—The annual report of the Council of this Academy has been prepared. It congratulates the Academy on the settlement of the whole question of its future position and rank in co-ordinance with the Royal Academy of London, a position and rank for which the Council express their gratitude to Government and Parliament on the one hand, and to the city authorities of Edinburgh on the other. The moiety of the new edifice, with its site on the mound, conjointly with the Scottish National Gallery, as our readers already know, is to be appropriated to the Royal Scottish Academy, on principles and conditions somewhat analagous to those on which the Royal Academy of London is accommodated in a portion of the National Gallery here. In gratitude to Lord Rutherford, as Lord Advocate, to Sir William Gibson Craig, M.P., and to Lord Cockburn, an old supporter of the Scottish Academy, the president, Sir John Watson Gordon, is spontaneously painting portraits of these gentlemen, and the Council have employed him to paint one of the Lord Provost of Edinburgh, Sir William Johnston, the whole to be added to the gallery of the Academy.

SOCIETY OF ARTS.—On Wednesday, the 7th inst., the fifth lecture on the Great Exhibition, as suggested by his Royal Highness Prince Albert, was given by Dr. Lyon Playfair, on "The Chemical Principles involved in the Manufactures shown at the Great Exhibition as a Proof of the Necessity of an Industrial Education." It was an excellent lecture; and we are glad to find that the discourse is to be published. It is to be hoped that the society will distribute it at the various manufactories and workshops wherein most of the articles were fashioned to constitute that Great Exhibition. A visitor present proposed, in a very praiseworthy manner, to commence a subscription, in order to defray the expense of distributing it, but the proposition was not very warmly received. We hope it is the intention of the society to take it into their own hands, and distribute it and the other lectures far and wide.

A STEPHENSON MONUMENT AT NEWCASTLE-ON-TYNE.—If a monument to the maturer of the railway locomotive be appropriate anywhere, it must be preeminently so at Newcastle, and we do not see how the Northumbrians can now delay a movement to that end. But don't clothe him in a Roman toga, says the *Gateshead Observer*; and assuredly the idea of decking out such a man in the secondhand clothes of old Rome is a somewhat incongruous one. There was little of the classic in his composition; yet a good deal of the Doric; and we cannot well conceive of even his statue looking down upon the Roman togery with any other expression than one of grim sarcasm. Even "flourishes" to his name, such as knighthood and the appendage F.R.S., &c., he rejected, though he could accept the honour of president to a mechanics' institute; and on this characteristic ground the editor of the local journal just named suggests that the most fitting monument to him would be a "Stephenson Institute," to be erected at the north end of the High Level-bridge, as part of the approach to that viaduct from the square of St. Nicholas. No more appropriate monument can well be conceived: it would have had his own approval, and as remarked, would be a means of elevating the "order" to which he belonged, and which he so greatly adorned.

THE SCOTCH IRON TRADE.—It is reported that last week, at Glasgow, prices of pig-iron were on the turn in favour of buyers. Warrants f. o. b. were quoted 38s. cash; No. 1, 38s. 6d. cash; and No. 1, Gartsherrie, 40s. 6d. cash against bill of lading, with little doing. The annual circular from Glasgow, of date 31st ult., has been sent us by Mr. Hu. Ferguson. We give some extracts from it:—In the unparalleled depression of 1842-3, best brands of pig-iron were sold at 35s. to 36s. cash. The average price of 1851 is 40s. against 44s. 4d. in 1850. The extreme figures it touched these years are 44s. and 37s., and 50s. and 41s. respectively. The stock at the various depots in England barely reaches an average, and there appears no reason to doubt the universal belief that it is remarkably low throughout foreign markets. In this locality there is, however, a considerable increase over 1850. The exports in 1851 were 452,758 tons, against 324,659 tons in 1850. We cannot overlook the fact of the discovery of immense fields of ironstone, and the erection, in other parts of the kingdom, of new works for reducing this ore. This may possibly affect Scotch pig-iron by supplying districts hitherto dependent on Scotland; nor will the American presidential message—recommending an increase of import-duty on foreign iron—be without some influence on the trade, whatever the ultimate result may be; and, till the European continent presents omens more peaceful and prosperous than are just now visible, the trade here need not expect any impetus by increased demand from that quarter. In fine, if no decided increase of demand is destined to be experienced in 1852, neither is it to be expected that the production will be much, if at all, increased; and, if we have no important advance in the price, that we have at all events arrived at a point, beneath which it is difficult to understand where the trade could succeed in finding a standing position. Bar-iron has been remarkably steady, having varied only 5s. per ton throughout the whole year, and the market now closing without animation at 5*l*. 5s. ordinary brands.

ELECTRO-TELEGRAPHIC PROGRESS IN RUSSIA.—Lieutenant Silemens, inventor of the electro-magnetic telegraphic apparatus employed in Germany, has set out for St. Petersburgh, by desire of the Czar. He is ordered to suspend a line, in the first instance, between the capital and Moscow, and afterwards another, connecting both with Warsaw and Odessa. Other lines will extend to the Caucasus, to the Ural, and the principal seaports.

HEALTH ACT IN CARDIFF.—At a meeting of the Cardiff Board of Health, held on Friday, the 3rd, Mr. Rammell's plan for the drainage of this town was adopted, and resolutions were passed requesting Mr. Rammell to furnish the board with a statement of the amount of his charge for preparing plan of drainage, and report thereon; for making all the working drawings, superintending the construction of the works, and performing, with regard to the same, all the duties of superintending engineer; also to prepare a specification of the various quantities of pipes required for the works, in order that advertisements may be issued for tenders to supply the same. The clerk was directed to inquire of Government, or of one of the insurance companies, whether they would advance the money required for draining purposes on the security of the rates, and in accordance with the provisions of the Public Health Act.